Exploring the Implementation of ERP as a Complex Innovation: the Case of the Kingdom of Saudi Arabia

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Abstract

Enterprise resource planning (ERP) systems have been highlighted in the literature as one of the most popular business management systems, providing the benefits of real-time capabilities and greater managerial control in organisations. With today's Information Technology (IT) market growth, Saudi Arabia's organisations have embarked upon ERP implementation systems as a common and necessary platform to leverage their competitive advantages. However, not all ERP implementations have been successful. Since ERP implementation brings substantial changes to organisations' business norms, processes, people, and culture, there are a number of challenges that organisations may encounter in implementing ERP systems.

The research in the ERP implementation spectrum has been mostly about the technical implementation of ERP systems. This study views ERP implementation as a complex system of innovation. It aims to not only identify the main enablers and inhibitors of ERP implementation as an innovation, but also to refine and redefine the measures required for successful implementation; thereby identifying the deeper insights and circumstances required for understanding the effects of learning and knowledge sharing on ERP implementation. The interpretivism paradigm was considered the most suitable approach for this investigation. An in-depth study was conducted through the use of semi-structured interviews with senior managers in organisations from different sectors and industries in Saudi Arabia, in order to cover as many key sectors and organisations as possible.

This study provided both theoretical and practical implications of ERP implementation success in general and for Saudi organisations in particular. It has identified 29 key factors affecting the success of ERP implementation. The majority of these key factors are investigated for the first time in Saudi Arabia. In general, it was found that ERP learning and knowledge sharing had a significant impact on ERP implementation with regard to organisations' levels of understanding, adoption and use of ERP functions in Saudi Arabia.

Dedication

This doctoral research is dedicated to the soul of my mother, who passed away recently, my father's soul, my wife Rabab, my daughters Leen and Sara and my mother-in-law.

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This PhD study has been an exceptional journey that required dedication and consistency whilst having family responsibilities and some professional engagements that need to be fulfilled as well. However, the outcome of this journey could not have been possible without a great deal of help and support from my family, friends and colleagues in Saudi.

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Additionally, I would like to thank all organisations and their senior executives who participated in the empirical research for sharing their experiences and for their cooperation in providing the crucial data required for completion of this thesis.

The Author

Khaled Alhajaj has been fascinated with the management of Information Systems' innovations. He has over 30 years of IT-related experience; he witnessed the start of the dot-com bubble burst in 1994, when he was undergoing further studies in the United States of America (USA). In the late 1990s, he started a number of websites, some of which had the highest rankings according to the Alixa website rankings. Later, he developed a pioneer online volunteering portal that, according to commentators, has been recognised as the most influential work that promoted volunteerism in the Arab world. This work has received a number of recognitions and awards locally and internationally.

Khaled is a Certified Internal Auditor (CIA) and a Certified Fraud Examiner (CFE), with an MSc in management from the University of the West of England (UWE). He worked in various jobs and industries, including chief financial officer (CFO), chief internal auditor (CIA), banking examiner and banking supervisor. He was a founder and CEO of an IT and a specialised stone and natural materials crafting company. He was the founder of a consulting company in Saudi Arabia and has been active in business development since 2002.

Prior to commencing his PhD study, Khaled was engaged in business development consulting. He provided consulting services to SMEs and mid-size Saudi businesses in a number of areas (e.g. business formation, ERP selection and implementation, strategic and business planning, business structures, enterprise systems [ES] solutions, internal audits, information systems auditing, fraud examination, and finance, accounting and business process re-engineering [BPR]). Furthermore, he was a consultant at the Shura Council (Majlis Ash Shura) as a volunteering expert and participated in the formation of the volunteering code in Saudi Arabia. Khaled, as a volunteer, has over 10,000 volunteering hours. He is a board member of two charity foundations and still provides free consulting service to a number of local and international charities and social work organisations.

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Abbreviations

BPM	Business Process Management
BPR	Business Process Reengineering
CIO	Chief Information Officer
CRM	Customer Relationship Management
CSF	Critical Success Factors
DBS	Database System
DSS	Decision Support System
ERP	Enterprise Resource Planning System
ES	Enterprise Systems
G20	Group of Twenty
GCI	Global Competitiveness Index
GDP	Gross domestic product
GII	Global Innovation Index
GOI	Global Opportunity Index
ICT	Information and Communications Technology
IR	Information Retrieval System
IS	Information System
ISR	Information Systems Research
IT	Information Technology
JAIS	Journal of the Association for Information Systems
JMIS	Journal of Management Information Systems
KSA	Kingdom of Saudi Arabia
MIS	Management Information System
MENA	Middle East and North Africa region
MISQ	MIS Quarterly
MRP	Material Requirements Planning
MRPII	Manufacturing Resource Planning
PDI	Power Distance Index
PoC	Proof of Concept
PPP	Purchasing power parity
RBV	Resource Based Value concept
SAGIA	Saudi Arabian General Investment Authority
SAR	Saudi Riyal
SCM	Supply Chain Management
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UN	United Nations
UTAUT	Unified Theory of Acceptance and Use of Technology
WTO	World Trade Organisation

Chapter One: Introduction

1.1 Overview

This chapter will provide a snapshot of the research, starting with a background that includes an overview of the current knowledge of the topic and existing gaps. Then, it will highlight the significance of conducting this research, and its contributions to the literature. The aims, objectives and research questions will then be presented, followed by an outline of research methods and the structure of the thesis.

1.2 Background

As stated by Getz and Robinson (2003), organisations need to either "Innovate or die". Innovation is believed to be a key driver of success for an organisation (Schillewaert *et al.*, 2005). Davenport (1993: p. xiii) stated:

> *Today firms must seek not fractional, but multiplicative levels of improvement – 10x rather than 10 per cent. Such radical levels of change require powerful new tools that will facilitate the fundamental redesign of the work… radical change is the means of obtaining the order-of-magnitude improvements necessary in today's global marketplace… existing approaches to meeting*

customer needs are so functionally based that incremental change will never yield the requisite interdependence.

A considerably large number of organisations, all over the world, are working within dynamic and unstable environments, which are characterized by market uncertainties, consistent technology changes, strong competitions and shortened life cycles of the products. (Dinopoulos and Syropoulos, 2007; Madrid-Guijarro *et al.*, 2002; Roy and Sivakumar, 2012). The essential ingredient for growth and, in fact, survival within the current environments, has been determined to be innovation. For Kanji (1996), innovation helps organisations reach and sustain process excellence, as well as growth and significant competitiveness. This is echoed by Cooper (2011), who argues that the goals of ambitious organisations, both in developed and developing countries, can only be achieved through innovation. It is, therefore, clear that an organisation cannot successfully improve and sustain its competitiveness in the dynamic global environment without being able to produce new and creative ideas, and being able to turn them into lucrative products and services (Gumusluog and Ilsev, 2009; Atalay and Anafarta, 2011).

This means that organisations need to develop and improve their processes and services through not only incremental innovation, but also through the adoption of more radical innovations (Soh *et al.,* 2000; Kraemmerand *et al.*, 2003; Boudreau and Robey, 1999; Klaus *et al.*, 2000; Otieno, 2010), such as the ERP system, aimed at introducing new processes and new ways of doing business. Wiele and Brown (1998) claim that the adoption of the ERP system brings changes in both the technical and managerial aspects within an organisation. Therefore, this research considers ERP to be a complex system (O'Leary, 2000; Bingi *et al.*, 1999; Klaus *et al.*, 2000) that aims to provide greater integration in business operations (Françoise *et al.*, 2009), and helps organisations in aligning their corporate strategy, business strategies and operations, in order to achieve dramatically improved outcomes in performance measurements such as cost, delivery time, quality, market share, customer loyalty and satisfaction (Nah *et al.*, 2001; Beheshti, 2006).

It is clear that ERP research has used general systems research as the foundation, to build on. Hence, IS research. A very large part of IS research considered the idea of IS implementation, which has led to a number of models and theories regarding IS implementation emerging, ever since. They all vary in terms of the investigation methods and research approach. Due to the number of contributions, IS implementation has been regarded as significantly diverse (Marble, 2000). Moreover, the general trend has been movement towards a greater focus on IS implementation research (Marble, 2000), with studies focusing on individual factors significant in the implementation, special types of systems, aspects of systems, countries or specific types of organisations. Therefore, this research assesses ERP implementation as an innovation, since it is a complicated and expensive experiment for any organisation (Robey *et al.*, 2002). Like most innovations, ERP implementation results in a substantial organisational change. Consequently, it is highly important for organisations to smoothly manage both technical and structural variables (Monk and Wagner, 2009). According to Davenport (1996), the execution of ERP systems is considered to be the most crucial experiment with regards to business change. Furthermore, the implementation of an ERP system is usually a massive challenge. This explains why Al-Mudimigh *et al.* (2001, p. 216) define ERP implementation as “a socio-technical challenge that requires a fundamentally different outlook from technologically-driven innovation, and will depend on a balanced perspective where the organisation as a total system is considered”.

1.3 Significance

The significance of this study can be explained by a number of reasons. First, the study essentially focuses on the implementation and diffusion of ERP as an innovation in Saudi Arabia, and it will be informed by a number of theories and concepts, including innovation diffusion (Rogers,1983, 2003), organisation theory, the concept of absorptive capacity (Cohen and Levinthal, 1990; Kedia and Bhagat, 1998; Mowery and Oxley, 1995), organisational learning (Chiva *et al.,* 2007; Goh and Richards, 1997), organisational culture (Nah *et al.,* 2007), and the theory of complexity (McElroy, 2000; Meek *et al.*, 2007; Rhee, 2000; Byeon, 2005).

Second, this study focuses on investigating ERP as a complex system of innovation; the complexity of an ERP system stems from interaction between many factors and actors (i.e. systems, subsystems, stakeholders, and various modules and functions). Additionally, cross-module and data integration and process standardisation add to the complexity of these systems, which often require the existence of a high level of absorptive capacity (Kwahk and Lee, 2008). Rogers (1983) suggests that the perceived complexity of any innovation, with the absence of appropriate skills and knowledge, can lead to change resistance. Furthermore, ERP implementation requires considerable changes that must be carefully managed in order to acquire the benefits of an ERP system. ERP systems are complicated and costly, and the implementation process is a significantly challenging, expensive and time-consuming project for any organisation (Davenport, 1998). ERP is considered to be a substantial investment for an organisation.

Third, although ERP systems have proven that there is still quite some demand and popularity for them, there is evidence which is beginning to surface; evidence that demonstrates how implementation success is convoluted, as compared to what those promoting and selling said systems would have organisations believe(Christofi *et al.,* 2013; Yusuf *et al.*, 2005). ERP implementation has its own series of issues, one of which is the disparity between the organisation's goals and the benefits attained from the system. This could ultimately result in failure and costly drawbacks (Dezdar and Sulaiman, 2009). ERP systems have the quality of affecting several aspects of the operations within the organisation, the success of said systems is vital to the performance of the organisation, as well as its survival (Al Rashid, 2012; Grabski *et al.,* 2001). These system implementations have a greater chance of failing than is commonly expected (Ahmad and Cuenca, 2013; Ziemba and Oblak, 2013).

Fourth, acquiring and implementing technological capabilities encompasses significant investments within the social and technological infrastructures (Feinson, 2003). Furthermore, it has been observed that developing countries often have disparity within organisational performance within a single industry (Feinson, 2003). Despite this, in several cases, there has been performance disparity between companies who are utilizing the same technology. This is a demonstration of the organisations' inability to utilise the technology effectively, and therefore the significance of instilling technological capabilities. In addition, the adoption of an ERP system in developed countries is relatively easy compared with developing countries. Sheu *et al.* (2004) suggest that there is no universal ERP system which can be implemented successfully in different countries without needing to resolve any incompatibility issues resulting from national differences. Therefore, one of the key challenges in developing countries is related to their level of knowledge, competencies and experience.

Finally, this research focuses on investigating ERP as a complex system of innovation in Saudi Arabia. It will investigate the national differences that have a strong effect on ERP implementation and innovation diffusion in Saudi Arabia. Saudi Arabia is one of the largest emerging economies in the world (G20), and is the largest economy in the MENA region. In addition, the Saudi ICT sector represents approximately 55% of the total IT in the MENA regional market, and ICT and ERP adoption has been increasing rapidly in both the private and public sectors; more ERP implementation will take place in the near future. This makes the Saudi context ideal for study, representing both developing and emerging economy countries, thus presenting the opportunity for studies of ERP implementation.

1.4 Research Gap

ERP implementation has been receiving a significant amount of attention within research-based literature, and there has been development of a number of perspectives, for the purpose of studying this phenomenon. A number of issues and topics with relation to the ERP phenomenon, have been addressed over time by several researchers (Botta-Genoulaz *et al.,* 2005; Moon, 2007; Esteves and Bohorquez, 2007; Schlichter and Kraemmergaard, 2010; Grabski *et al.,* 2001). However, despite the importance of implementation, which is studied heavily in prior studies, implementation as a term is used most of the time for the technical implementation, which mainly pertains to ensuring that system development is finalised and that the system is functioning adequately in pure technical terms

(Walsham, 1995). Implementation as a term It is also used for human and social interaction with the system, regarding whether members of the organisation are using the system on a regular basis or not, and whether they value the system or not (Walsham, 1995). Moreover, Velcu (2007) claims that in the early years of ERP implementation, technical-oriented implementation was responsible for most of the failures in implementing ERP, as organisations placed more emphasis on the technical perspective than a specific business orientation. Nonetheless, implementation in the ERP field is sometimes used to represent the whole ERP life cycle, while also being used merely to represent the implementation stage (Esteves, 2004). Similarly to the innovation process (Saad, 2000; Jones and Saad, 2004), the ERP implementation stage is the most essential part of the ERP life cycle. According to Mertrejean and Stocks (2011), this stage could range from 14 to 23 months.

In addition, most studies of ERP implementation focus on critical success factors (CSFs) (e.g. Moohebat *et al.,* 2010; Vayyavur, 2015; Ngai *et al.,* 2008; Somers and Nelson, 2001; Al-Mashari *et al.,* 2003; Holland *et al.,* 1999; Nah *et al.,* 2001), which represent the predominant research in ERP implementation. Although the concept of CSFs is widely used in ERP systems research (Somers and Nelson, 2001), it is also criticised. Davis (1989) argued that this approach places more stress on the importance of certain factors, while neglecting many other important aspects that can play a critical role during implementation. In accordance with this, Gupta and Naqvi (2013) argued that although CSFs studies may appear to be a perfect set of factors available to guide and monitor ERP projects, there are still many areas that need to be addressed by CSFs in general. Additionally, CSF studies are limited to the context, setting, scope and stages of the ERP project of the respective studies. This means that some CSFs may or may not be adopted in other studies, and so some CSFs could become more popular than others. Some researchers even referred to the development of long lists of CSFs in ERP implementation research as "laundry lists", since they lack insight into how one affects another and vice versa (Akkermans and Van Helden, 2002; Richmond, 1993).

The Saudi government enforced the adoption of IT, due to the government’s awareness regarding the adoption of IT functionality improving the productivity of national organisations (Baker *et al.,* 2007). As a result, during the last decade in Saudi Arabia, ERP systems have been introduced in many different organisations in both the private and public sectors. However, ERP implementation remains a highly critical issue in Saudi Arabia (Bazhair and Sandhu, 2015), as the acceptance of technology in general is one of the main negative issues to be addressed (Kwahk and Lee, 2008; Santamaria-Sanchez *et al.*, 2010). ERP implementation in Saudi Arabia is often faced with resistance, as the users feel that the changes in power structures can lead to significant problems in terms of changes in the output of the firm (Bazhair and Sandhu, 2015; Chen *et al.*, 2008; Vandaie, 2008).

Very little research is related to IT adoption in the Arab and Gulf countries, due to the lateness of their technology adoption (Al-Turki, 2011). The adoption of IT in the Arab and Gulf countries took place in the 1990s (Baker *et al.,* 2007), which reveals how cultural and social factors appear to play a huge role in moulding the perception of IT adoption and acceptance (Al- Turki, 2011). This implies that IT adoption in Saudi Arabia might be different from other developing countries. Saleh *et al.* (2013), studying ERP implementation success factors in Saudi Arabia, found that ERP implementation projects in Saudi Arabia are relatively unsuccessful. Saudi Arabia as a developing country faces various challenges when implementing technologies, information systems, management processes and techniques that have been formulated and established in developed countries (El Sawah *et al.*, 2008).

Most ERP studies in Saudi Arabia have essentially been undertaken from the information technology and information system perspectives, as illustrated in Table 1.1. There are hardly any studies examining the issue of implementation from an innovation management perspective. In addition, there are no studies that conceptualise ERP implementation in terms of learning and knowledge integration and sharing. Thus, there are no studies on how ERP learning and knowledge sharing are operationalised and integrated among the various ERP stakeholders, such as project team members, users, top management and vendors within an organisation.

Table 1.1 Summary of ERP-related studies in Saudi Arabia

ERP issues investigated	Selected sources
General technical aspects	Al- Mashari, 2001; 2003; Al-Mashari and Al-Mudimigh, 2003; Al-Mashari and Zairi, 2006; Al-Mudimigh *et al.,* 2001
Information transparency	Al-jabri, 2015
Cloud ERP	Awad, 2014; AlBar and Hoque, 2015; Alsanea, 2015
Critical success factors (CSFs)	Abukhader, 2015; Al-Turki, 2011; Zubair and Zamani, 2014; Saleh *et al.,* 2013; Aldammas and Al-Mudimigh, 2011; Aljohani *et al.,* 2015; Al-Turki, 2011; Aldayel *et al.,* 2011; AlQashami and Mohammad, 2015
User acceptance	Bazhair and Sandhu, 2014; 2015; Alhirz and Sajeev, 2015; Alhirz and Sandhu, 2007
Employee empowerment	Hossain *et al.,* 2011
Information transparency	Al-jabri, 2015
Change management	Bazhair and Sandhu, 2015; Al-shamlan and Al-mudimigh, 2011; Al-nafjan, 2011; Alballaa and Al-Mudimigh, 2011
Consultancy services	Alhakbani and Alnuem, 2012
Stakeholders	Al.Rashid, 2013; Althonayan, and Papazafeiropoulou, 2013; Althonayan, 2013
Accountants' perceptions	Al-Muharfi, 2014
Knowledge management	Al-Sabri and Al-Saleem, 2013
Post-implementation	Imran, 2013
Culture	Alhirz and Sajeev, 2015; Abdelghaffar, 2012; Hossain *et al.,* 2011
Higher education (HE)	Al-Mudimigh and Ullah, 2001; Al-Mudimigh and Ullah, 2011, 2009; Al-Shamlan and Al- Mudimigh, 2011; Al-Hossan and Al-Mudimigh 2011; Al-Mudimigh *et al.,* 2009; Imran, 2013; Awad, 2014; AlBar and Hoque, 2015; Althonayan and Papazafeiropoulou, 2013; Althonayan, 2013; Al-shamlan and Al-mudimigh, 2011; Al-nafjan, 2011; Alballaa and Al-Mudimigh, 2011; Aldayel *et al.,* 2011, AlQashami and Mohammad, 2015

Source: The researcher

The diffusion of information technology in a region such as Saudi Arabia is essentially critical process and involves several problems, as well as risks Thus; it involves a series of challenges that may hinder the diffusion of technology innovation implementation. These challenges are essentially attributed not only to the technological issues, but also cultural, political, economic and social factors as well (Al-Sudairy and Tang, 2000). Based on the above literature analysis, there appears to have been a shortage in studies on ERP implementation as an innovation in Saudi Arabia, a gap in the literature which this study is intended to fill, both in general and in the Saudi context in particular.

1.5 Research Questions

This research proposes to explore the implementation of ERP as a complex innovation through the investigation of its key determinants in a developing country such as Saudi Arabia.

From reviewing the literature, a number of questions remain unanswered, including:

1- What are the key organisational factors affecting the ERP implementation?
2- What are the key factors affecting the adoption and diffusion of ERP?
3- What are the key factors affecting ERP's learning and knowledge sharing?
4- What are the key cultural factors affecting ERP learning and knowledge sharing?

1.6 Research Aims and Objectives

The aim of this research is to contribute to explore and identify the key factors that enable or inhibit the ERP implementation as an innovation, and their effect on the failure or success of ERP implementation in Saudi Arabia. To achieve this aim, the following main objectives of the research must be accomplished:

2 To explore and identify those key factors that enable or inhibit the ERP implementation as an innovation, and their effect on the failure or success of ERP implementation in Saudi Arabia.
3 To critically evaluate the current literature regarding ERP implementation.
4 To gain a better understanding of the importance of the key organisational arrangements, learning and knowledge sharing, and the cultural arrangements that could increase the success of ERP implementation.

4.1 Research Method

This study aimed not only to identify the main enablers and inhibitors of ERP implementation as an innovation, but also to refine and redefine the measures required for successful implementation, thereby identifying the deeper insights and circumstances required for understanding the effects of learning and knowledge sharing on ERP implementation. Therefore, the evaluation of the research focus and prevailing methodologies suggested that the case study through the interpretivism paradigm would be the most suitable approach for this study. An in-depth case study utilising semi-structured interviews was conducted. Organisations were selected from different sectors in order to cover as many key sectors and organisations as possible, representing banks and financial services, agriculture, education, health and hospitals, hotels and tourism, industry, logistics, the military, retail, telecommunications and IT, and transportation. The interviews were conducted with senior managers, including Chief Executive Officers, Chief Technology Officers, project managers, Chief Information Officers and business managers with direct involvement in the adoption and implementation of ERP in their respective organisations. Twenty-five executives were interviewed for this study. Initial coding and focused coding were used in the first round of analysis to identify the main themes, representing the theoretical findings from the literature review. In the second round of data analysis, coding was used to discover the links between these themes.

4.2 Thesis Structure

This research thesis is divided into eight chapters as follows:

Chapter 1: Introduction. The first chapter is an introduction to the thesis and organisation of chapters. It presents the general background of this research, covering innovation and the ERP implementation in general, providing a brief overview of the status of the literature, and identifying existing knowledge gaps. Next, the significance of this research is highlighted, followed by the research questions, aims and objectives. Finally, this chapter concludes with a brief description of the methodological approach employed and an overview of the thesis structure.

Chapter 2: Innovation. This chapter offers an analytical overview of existing literature on the different views of the concept, and definitions of innovation and its key characteristics. Innovation generations and the historical development of innovation is discussed. In addition, the different types of innovation, the process of innovation, and key factors that affect the diffusion and implementation of innovation are investigated. Finally, the importance of learning as a crucial condition for innovation is discussed in order to investigate how learning affects the implementation of an innovation such as ERP.

Chapter 3: Enterprise Resource Systems (ERP). This chapter uses the main theoretical findings highlighted by Chapter Two in order to investigate the key characteristics affecting the successful implementation of ERP as a complex system of innovation. This chapter offers an analytical overview of existing literature regarding the different views and definitions of ERP; the background of ERP systems; the key benefits, drawbacks and limitations, and the anatomy and characteristics of ERP innovation. In addition, this chapter also reviews a number of theoretical and empirical works that have explored the ERP implementation stages from information technology (IT), information systems (IS) and innovation perspectives. The key factors for successful implementation of ERP systems, main motives for ERP implementation, stakeholders, main strategies and methods for the adoption and implementation of ERP as an innovation will be examined and discussed. This chapter also discusses the importance of learning in ERP implementation, and the need for organisational change and organisational culture management, as the main factors associated with the successful implementation of ERP as an innovation.

Chapter 4: Background to the case of Saudi Arabia. This chapter investigates and discusses relevant aspects such as the political, economic, global economic, financial and performance indicators, and the innovation, culture and ERP implementation contexts in Saudi Arabia. In addition, this chapter also aims at understanding the nature of any existing problems that may prevent Saudi organisations from successfully implementing ERP systems.

Chapter 5: Methodology. This chapter presents and explains the research strategy, data collection methods, sample design and data analysis methods chosen to fulfil the objectives of the present study. The discussion in this chapter considers how the research design reflects the objectives of the thesis. Moreover, the chapter explains the position of the present study in relation to the major scientific research paradigms and philosophies. Furthermore, it presents a general review of research methodologies by examining the philosophical paradigms in information systems research, followed by describing different research approaches. The undertaken study is evaluated, assessing the strengths and weaknesses of the study in the context of the paradigms and methods adopted, the constraints imposed upon the researcher, and the need to adapt the research strategy as the study progressed. Rationale justifications for selecting the interpretivism approach are provided. The chapter also outlines the methods adopted for conducting the fieldwork of the present study, considering types of method, their definitions, advantages and disadvantages, and sampling procedures, as well as the rationale behind the use of these methods. Semi-structured interviews represent the method used in this study.

Chapter 6: Findings and Analysis. This chapter presents and analyses the qualitative data gathered by using semi-structured interviews. The presentation of findings is grouped into five sections: the first focusing on background, while the remaining four are presented according to the four main research questions. The first section presents background information on organisations and interviewees. The second section analyses the organisational factors affecting the ERP implementation. The third section presents the analyses of the factors affecting the adoption and diffusion of an ERP project. The fourth section presents the analyses of the factors affecting ERP's learning and knowledge sharing. The final section presents the analyses of the cultural factors affecting ERP learning and knowledge sharing.

Chapter 7: Discussion. In this chapter, the significance of the results is comprehensively explained and associated with the research objectives. The findings and analysis of the fieldwork are linked to findings from the literature review and discussed in order to draw this thesis' conclusions. This chapter discusses the findings of the analysis constructed in Chapter Six. The discussion and outcomes of this chapter are based on the four main research questions. It discusses the key organisational factors affecting ERP implementation, the key factors affecting the adoption and diffusion of ERP, the key factors affecting ERP's learning and knowledge sharing, and the key cultural factors affecting ERP learning and knowledge sharing in Saudi Arabia.

Chapter 8: Conclusion. This chapter summarises the research and its contribution to knowledge, theory and contribution practice, draws conclusions, and offers a set of recommendations for future research. It also highlights the research limitations requiring further attention.

Chapter Two: Innovation

2.1 Overview

This chapter offers an analytical overview of existing literature on the different views of the concept and definition of innovation and its key characteristics, in order to identify the most appropriate definition for the purposes of this study. Innovation generations and the historical development of innovation are discussed in order to shed light on how the understanding of innovation has evolved. In addition, the different types of innovation are investigated in order to better identify the type of innovation that ERP can be associated with. The process of innovation is also examined in order to identify the key stages of innovation that can be relevant to ERP. The key factors that affect the diffusion and implementation of innovation are discussed in order to investigate what is needed for a successful diffusion and implementation of an innovation such as ERP. Finally, the importance of learning as a crucial condition for innovation is discussed in order to investigate how learning affects the implementation of an innovation such as ERP.

2.2 Definition and Key Characteristics of Innovation

The objectives of this sections are to gain a better understanding of the complexity of the innovation process and to identify its key features that can help defining ERP as a complex system of innovation characterized by series of interaction between stages, factors and actors. The understanding of innovation has changed in the last several years, in terms of definition (Godin, 2008; Kotsemir and Abroskin, 2013). During the aforementioned period, the very concept of innovation slowly changed, from the valid scientific definition which it once had, to a rather vague idea, as well as buzzword. Therefore, the increased understanding of innovation has led to the fact that there is no one single understanding, or unified concept behind innovation, hence the definition.

The term itself, 'innovation', is used more and more by marketing professionals, policy makers, management consultants, and advertising specialists, not as a concept with a string base in science, but as more of a metaphor, a slogan, political promise, or only just a buzzword (Kotsemi *et all.* 2013). According to Roger (2003), innovation is an idea, object or a practice that is new for a person or company incorporating it and exploiting it. It can be described as an application of fresh ideas to products, processes or any other facet of an organisation's activities. Innovation is primarily concerned with the process of extracting value or commercialising from good and valuable ideas and plans (Rogers, 1998). Kotsemi and Meissner (2013: p.3) view innovation practice today as a term that is:

> *… free of values and comprehensive covering the whole spectrum of activities from discovery to first time practical application of new knowledge of any kind which aims at the fulfilment of requirements and meeting the goals of recipients in a new fashion, where risk and uncertainty is inherent at any stage*.

Jones and Saad (2003) are of the opinion that innovation is not a single or instant act, but an entire chain or occurrences which take place over the course of time, and which contain the relevant activities of bringing the product or service to the market.

Many researchers consider innovation to involve the formation of something new, pertaining to the creation and adoption of new ideas (Zaltman *et al.,* 1973; Shepard, 1967; Nohria and Gulati, 1996; Djellal and Gallouj, 2001; Klein *et al.,* 2001; Baregheh *et al.,* 2009; Rickards, 1985; Pavitt, 2003; Damanpour and Evan, 1984; Grawe *et al.,* 2009; West and Farr, 1990; Egbu, 2004; Tushman and Nadler, 1986; Rogers, 1995; Hurley and Hult, 1998; Kim *et al.,* 2012). Innovation is regarded as a non-simple phenomenon which includes new ideas to be generated, which can then be translated into a brand new process or product (Lohmüller, 2003). For example, Rogers (1995) demonstrates that innovation formulates a brand new concept, idea or object, according to some individual's view, or adoption unit. On the other side, Amabile (1983) has the suggestion that innovation does not just encompass creativity, as creativity is basically being able to come up with ideas. Innovation, according to Trott (2012), produces and puts into place new products and ideas. Therefore, creativity has thereby been found to be a vital component of innovation (West and Farr, 1990). According to Pavitt (2003), innovation can be defined as the exploitation and exploration of opportunities, in terms of new and better products, services and processes. Furthermore, it means to introduce new solutions for existing problems. For example, the formation and introduction of e-banking services is considered an innovative idea that cuts costs and provides improved banking services. Moreover, innovation can be defined as the creation, development and usage of a behaviour or idea which is new to the organisation that is adapting it Damanpour, 1996; Higgins, 1995; Baregheh *et al.,* 2009).

As shown in Table 2.1, there are different views and definitions of innovation. Most of them describe innovation as a complex process (Lohmüller, 2003) and stress the importance of newness (Rogers, 1995; Zaltman *et al.,* 1973; Damanpour and Evan, 1984) and implementation (Tidd *et al.,* 2005; Mulgan and Albury, 2003; Jones and Saad, 2003), leading to value creation (West and Farr, 1990; Grawe *et al.,* 2009; Kim *et al.,* 2012). The concept of innovation applies to areas of application such as anthropology, sociology, engineering, organisation theory, psychology, political science and economics (Ram and Pattinson, 2009). Each of the aforementioned areas has its own scrutinized version of the concept of innovation (Jones and Saad, 2003). Kotsemi *et al* (2013: p. 11) analysed a number of definitions of innovation, coming to the conclusion that:

- The definitions of innovation are related in terms of efficiency and change, as well as newness, with the former in terms of market capture and quick promotion of latest products.
- The concept of innovation cannot be set in stone via a comprehensive, accurate and broadly accepted definition (as an example, 'debt', 'amortisation', 'inflation', among various other economic terms and concepts).
- Innovation is quite a broad concept, and each field of science sees the concept differently, in terms of aspects. As an example, economic theory sees innovation as pertaining to 'new' concepts, whereas management sees the value creation (competitive advantage) aspect as greater, in terms of significance.

Table 2.1: Similar popular definitions of innovation with the view of newness.

Definition	Selected sources
Innovation is a practice, material artefact or an idea which is perceived to be recent, by the unit which is adopting it.	Zaltman *et al.*, 1973
When an organisation learns a new skill, which it did not know before, it is termed as innovation.	Shepard, 1967
Any structure, policy, process or method, market opportunity or product, which is perceived as new by the unit manager.	Nohria and Gulati, 1996
Any practice or technology which the company is utilizing for the very first time, regardless of pervious usage by other companies.	Klein *et al.*, 2001
It is a process consisting of several stages, which comprises of organisations transforming ideas into brand new products, processes and/or services, in order to compete, advance and differentiate themselves within the market.	Baregheh *et al.,* 2009
It is any thing, behaviour or thought which is new.	Rickards, 1985
The exploitation and exploration of opportunities, for band new products, services or processes.	Pavitt, 2003
The adoption of a behaviour or idea which is completely new to an organisation.	Damanpour and Evan, 1984
Service innovation is formation of a service which is new and assistive to a particular set of people or audience.	Grawe *et al.,* 2009
Innovation can be defined as intentional introduction, and subsequent application of ideas, products, procedures and processes, within a group, role or the entire organisation, which is completely new to the unit which is adopting it. It	West and Farr, 1990

is designed to benefit the individual, organisation, or even society, solely.	
Innovation can be perceived as an interlinking sequential process, ranging from idea exploitation to idea generation, which is not bound by margins of definition, and is often subject to change.	Egbu, 2004
Innovation is the creation of a product, process or service which is brand new to a business unit.	Tushman and Nadler, 1986
It can be defined as openness to and acceptance of new ideas, as aspects of the culture of a firm.	Rogers, 1995
It is the notion of openness to new ideas as aspects of a firm's culture.	Hurley and Hult, 1998
A new application of ideas, methods, knowledge, as well as skills, which are capable of generating unique capabilities, in order to leverage the competitiveness of the organisation.	Kim *et al.,* 2012

Source: The researcher

The "innovation" phenomenon is therefore strongly associated with newness. For Rogers (1985), the aspect of newness, within an organisation, may be and is expressed in terms of knowledge, a new adoption decision or persuasion. According to Slappendel (1996), the perception or the idea of newness is regarded as instrumental to the innovation concept, since it distinguishes change from true innovation. According to Djellal and Gallouj (2001), innovation is basically new ways of producing and/or delivering services, or significant service changes, or even the delivery and production. Innovation, therefore, a connotation of organisational change; innovation is conceived as a means of changing an organisation, either as a response to changes in the external environment, or as a pre-emptive action to influence the environment (Damanpour, 1996).

Most of the definitions of innovation stress the importance of new idea and implementation. This implies the need to investigate the importance of newness and implementation in ERP, which will be discussed in Chapter Three. ERP is a new initiative (Light and Papazafeiropoulou, 2004), which needs to be successfully implemented in order to help organisations enhance their performance (Shang and Seddon, 2002; Nicolaou and Bajor, 2004; Gattiker and Goodhue, 2000; Yen *et al.,* 2002; Umble *et al.,* 2003) and competitiveness (Bingi *et al.*, 1999; Hasan *et al.,* 2011;

Shang and Seddon, 2002) through value creation (Shang and Seddon, 2002; Bergstrom and Stehn*,* 2005; Gardiner *et al.,* 2002; Hasan *et al.,* 2011).

2.3 Innovation Generations and Models

After reviewing the main definitions and key characteristics of innovation, this section explores the innovation models in order to shed a light on how our understanding of innovation has evolved. The importance of understanding innovation as a process, lies in how it assists us in the identification of the key stages, while shaping the way by which we attempt to manage them (Tidd and Bessant, 2011). Hobday (2005) claims that since the 1950s era, there has been a large influx of innovation types and models, with each making a claim of innovation guidance and/or explanation, within the industrial firms. A number of recognised publications address management models of innovation, such as Verloop (2004), Niosi (1999), Cagnazzo et al (2008), Eveleens (2010), Jacobs and Snijders (2008), and Trott (2012).

Rothwell (1994) has a model with a distinctive feature, which is the detailed analysis of the innovation management models, as well as their socio-economic framework. Rothwell (1994) also concentrates on the natural development of companies' innovation strategies, which are existing is various economic situations (Kotsemir and Meissner, 2013). Rothwell (1994) identifies in his seminal work, five different generations of innovation handling models and explains their natural development over time, as well as the respective management strategy framework and socio-economic policy-making.

Tidd (2006) is of the opinion that Rothwell (1994) put forth a historical perspective regarding innovation management which has proven to be quite useful; while giving the suggestion that we have begun to appreciate the innovation process nature in an evolved manner, from the linear models which could be seen in the 60s, to the complex interactive models of today.

Rothwell (1994) put forward the argument that the post-war era had a number of technological innovation influences, which were closely related to an evolution within the corporate strategy. The ever-increasing complexity as well as pace of technological change within industries, is forcing firms to garner new horizontal as well as vertical alliances, and to work towards even greater efficiency and flexibility in their response to changes in the market (Rothwell, 1994).

Before discussing individual models, it is useful to emphasise five cautions stressed by Rothwell in his introduction to the five generations (Eveleens, 2010):

1. The evolution from one generation to another does not imply any automatic substitution of one model for another; many models exist side-by-side and, in some cases, elements of one model are mixed with elements of another at any particular time;
2. Each model is always a highly simplified representation of a complex process that will rarely exist in a pure form;
3. Often the progress from one generation to another reflects shifts in the dominant perception of what constitutes best practice, rather than actual progress;
4. The most appropriate model will vary from sector to sector, and between different categories of innovation (e.g. radical or incremental);
5. The processes that occur within firms are, to an extent, contingent on exogenous factors such as the pace of technological change.

Rothwell's (1994) proposed a fifth generation of innovation process model which place a greater emphasis on on-going learning, integration and networking) within and between firms. According to this particular model, innovation is fundamentally and generally a distributed networking process (Hobday, 2005). This also has applications to the ERP, in which a high level of complexity can be observed, while requiring a significant burden of learning on new users, both in terms of comprehending the system, as well as learning how to correctly utilize it (Kei and Wei, 2006).

The primary difference between the fifth and fourth generation models, was the usage of an electronic set of tools, which operated in real time, to automate and ultimately speed up the innovation process within the firm (Rothwell, 1994). Progress in information technology (IT), such as the ERP systems, made it possible to induce integrated and concurrent product development (Ahmed and Shepherd, 2010). ERP integrates application and process (Shang and Seddon, 2002); it also provides an operational improvement by enhancing the decision-making process of the organisation in real time, aiding strategic goals (Davenport, 2000; Markus and Tanis, 2000; Ross and Vitale, 2000; Holland *et al.,* 1999; Cooke and Peterson, 1998; Gartner Group, 1998).

The fifth-generation process, as put forth by Rothwell, was dependant on the usage of sophisticated electronic implements, in order to enhance the efficiency and pace or product development throughout the entire innovation network. This includes in-house function, external collaborators and customers, as well as suppliers (Hobday, 2005). The aforementioned electronic product development implements allow efficient and real-time information handling across the entire system of Innovation (Ahmed and Shepherd, 2010).

A good example of these technology advanced information systems is the manufacturing resource planning system (MRPI), MRPII and the enterprise resource planning system (ERP). The essential function of MRPII is to schedule and monitor the execution of production plans in real time (Basoglu *et al.,* 2007) to adapt to the rapid changes of business needs (Davenport, 2000). According to Rothwell (194: p.25) following are the primary aspects of the fifth-generation model are: a) integration, b) flexibility, c) networking and d) parallel (real-time) information processing, corresponding to the key characteristics of ERP, which will be examined in depth in the next chapter.

2.4 Types of Innovation

This section is devoted to the investigation of the different types of innovation. It will help to better identify the type of innovation ERP is (it will be further discussed in chapter three). The theories of innovation have acknowledged several types of innovation that are applicable to various kinds of industries. Innovation is often characterised by a high complexity requiring unconventional thinking and in result social acceptance (Ram and Pattinson, 2009). Therefore, innovation as a term includes new organisational, economic, technological, as well as social solutions, that are not marketable necessarily, in a purely economic sense, with a direct monetary result. They are however being used, and are applicable (Ram and Pattinson, 2009). The typology of innovation has seen a shift, from a well-structured system, more or less, to a system that contains a significant number of different elements (Kotsemir and Meissner, 2013).–Researchers (Gopalakrishnan and Damanpour, 1997; March, 1991; Damanpour *et al.,* 2009; Dewar and Dutton, 1986; Ettlie *et al.,* 1984; Normann, 1971) have provided various classifications of innovation. Innovation may also be classified according to the degree of newness. However, innovation in organisations may vary; as there is no single type of innovation that can be used for all organisations or that is suitable for all times and/or places. While, the use of any type of innovation depends mainly on organisational competences, capabilities, processes, resources, products and/or services. In the next sections, the most common types of innovation will be discussed following Gopalakrishnan and Damanpour (1997) and Wolfe (2007) work in classifying innovation. The main contrasting types of innovation include radical, incremental, organisational, technical, administrative (none-technical), product and process.

First, radical innovation, in which the degree of innovation (radical, incremental) can be classified by the level of change it brings either to the organisation itself or to the market. Radical innovations refer to "fundamental changes that represent revolutionary changes in technology" (Dewar and Dutton, 1986: p. 1422). Radical innovation is often used to describe disruptive innovation (Blackwell *et al.,* 2009). For Blackwell *et. al.* (2009: p. 18), this is not accurate since the radical innovation is "a breakthrough literally breaks through a boundary, while a disruption reorganises the boundaries in the course of disrupting structures". Furthermore, the radical innovation involves fundamental changes to the whole business/product/service. These changes, which brings a complete new phenomena known as the disruptive innovation. For Dewar and Dutton (1986), radical innovation brings newness and fundamental change in products, services, processes and procedures, as means to cope with the turbulence of the business environment. Leifer *et al.* (2000: p. 8) state that a "radical innovation includes totally new, or at least significantly different, characteristics, which create a substantially higher degree of customer benefits". This type of innovation is also known as revolutionary changes in a firm's existing practices. Organisations have to make extensive investments in the processes of production, communication and distribution. Consequently, the risks of radical innovation are higher when the development cycle is too long and can therefore reduce the rate of success of the successful implementation of innovation (Moosmayer and Koehn, 2011).

In addition, the implementation of radical innovation requires high levels of organisational capability (e.g. technical capabilities), competencies and resources. This is why Kusonoki (1997: p. 369) argues that a radical innovation "requires a new set of organisational capabilities embedded in structures, communication channels, and information processing procedures of organisations, and it is usually quite difficult for established firms to adjust their organisational capabilities for developing innovative products". This means that "radical innovation is high risk and high return…and [it] requires a different set of rules and knowledge accumulation to manage the innovation process" (McLaughlin *et al.,* 2005: p. 3). Likewise, Herbig (1994) emphasises that a radical innovation involves a high cost and high risk.

Second: Incremental (Continuous) innovation means improvements to the existing products, technologies or services and it is focused to the existing markets. Carlisle and McMillan (2005: p. 3) state that:

> *In the short run, organisations must exploit existing knowledge, competences and capabilities, making incremental improvements where possible to sustain their edge.... In the long term, survival demands that organisations explore new knowledge and new environments to build new competences and fresh capabilities for the future.*

Incremental innovation is opposite to radical innovation in that the product or services lines remain similar in this case with only small changes to existing technology, which still comes under the realm of innovation. The OECD (1994) provided the definition of incremental innovation as being an existing product whose performance has been significantly enhanced or upgraded. The essence of incremental innovation includes organisations building upon a current knowledge base, which they attained internally. This knowledge is then utilised to create additional value for the organisation, using incremental changes in services and products, although a radically novel innovation would require new knowledge creation for the same reason. Similarly, incremental innovation will include only minor technological enhancements, in contrast to radical technologies.

Von Stamm (2008: p. 271) argues that "incremental and radical innovation require very different business factors, skills, structures and processes". Furthermore, McLaughlin *et al.* (2005: p. 4-7) state that:

> *…different kinds of innovation require different kinds of organisational hardware (structures, systems and rewards), and different kinds of software (human resources, networks and culture)… during periods of incremental change organisations can rely on units with relatively formalised roles and responsibilities, centralised procedures, functional structures, efficiency-oriented cultures, strong manufacturing and sales capabilities and relatively homogeneous, older and experienced human resources… These units are characterised by a high degree of inertia, emphasizing efficiency, teamwork and continuous improvement… during periods of discontinuous (radical) innovation, organisations require entrepreneurial "skunk works" type of units… These units are relatively small, have loose decentralized product structures, experimental cultures, strong entrepreneurial and technical competencies and relatively young and heterogeneous employees.*

For organisations, incremental innovation may offer bigger gains in the long run than occasional radical changes as the future competitive requirements can be met within existing industry structures (Garcia and Calantone, 2002; Tidd and Bessant, 2009). However, not all the incremental changes in a product or service can be seen as an innovation. In order to be recognised as an innovation, the changes need to have a certain scale of impact (Tidd and Bessant, 2009).

Third: organisational innovation. Armbruster *et al.* (2008) state that organisational innovation is the use of new managerial and working concepts and practices. Changes here are either directly or indirectly related to the work activities and management as well. Gera and Gu (2004) argue that organisational innovation is a concept that encompasses strategic, structural and behavioural dimensions. The OECD (2005) offer an even more general and holistic definition of organisational innovation by including the organisation's external relations: "the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations" (OECD, 2005: p. 51). According to the OECD (2005), Murphy and Simon (2002) and Uhlaner *et al.* (2007), organisational innovation covers three types of practice: 1) management practice (teamwork, knowledge management, flexible work arrangements), 2) production approaches (change to the work organisation: total quality management, business re-engineering), and 3) external relations (outsourcing, networking, customer relations and supply chain).

Fourth: technological innovation. According to Phillips (1997), is often seen as encompassing product and process innovation. Bringing changes that are significantly improve products or services by using technology is considered technological innovation. The OECD (2005: p. 31) view of technological product and process (TPP) innovations is as follows:

> *TPP innovations, comprise implemented technologically new products and processes and significant technological improvements in products and processes. A TPP innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation). TPP innovations involve a series of scientific, technological, organisational, financial and commercial activities.*

The OECD (2005: p. 32).definition differentiates product from process innovation in that "Technological process innovation is the adoption of technologically new or significantly improved production methods, including methods of product delivery". These methods can and might involve alterations in production organisation and equipment, or a combination of both. It can also be derived from the usage of new knowledge may be intended to produce or deliver technologically new or improved products, which cannot be produced or delivered using conventional production methods, or essentially to increase the production or delivery efficiency of existing products" (OECD, 2005).

Fifth: administrative innovation: the distinction between technical innovations and administrative innovations reflects a more general distinction between social structure and technology (Damanpour and Evan, 1984). This means that distinguishing technical and administrative innovations helps in understanding the organisational differences in response to these different types of innovation. The administrative innovations involve changes to the structure or the administrative process and organisational structure of an organisation, whereas the technical innovations involve production technology, production processes, products and services.

Sixth: product innovation, refers to new or developed final products (goods or services). These products may be brand new to the world and/or the firm (Edquist *et al.,* 2001). Product innovation describes a product or service that is new or significantly improved in order to meet the new desired characteristics. Product innovations include significant improvements in technical specifications, components and materials, incorporated software, usability, or other functional characteristics. These improvements can be implemented through utilisation of new knowledge or technologies, or by combining existing knowledge or technologies (OECD, 2005). Moreover, product innovation gives a firm more flexibility in adapting to the needs of new customers (Lichtenthaler and Ernst, 2012).

Seventh: process innovation is the discovery of a new method or process, for goods and service production (Damanpour, 1991; Egbu, 2004). It pertains to new or developed implements that take resources and transform them into outputs. Process innovation has production time and cost reduction as its primary aim. It affects changes in the method of product or service creation and delivery to the relevant markets (Tidd and Bessant, 2009).

A better process innovation understanding permits organisations to gain competitive advantage (Reichstein and Salter, 2006). This includes innovation-related operation, as well as changes in the production process. It therefore has the capability of adopting to changes in the environment. Friedrich *et al.* (2010: p. 8) state that process innovation involves processes that "are not as visible to those outside the organisation and include changes in the procedures by which products are made, business is conducted". Table 2.2 provides summery of the main contrasting types of innovation, based on the type of innovation and its definition.

Table 2.2: Innovation typology.

Innovation type	Definition	Selected sources
Radical	Changes on the fundamental level which are a representation of huge technological changes.	Gopalakrishnan and Damanpour, 1997; Wolfe, 2007; Dewar and Dutton, 1986; Blackwell *et al.,* 2009; Leifer *et al.*, 2000; Moosmayer and Koehn, 2011; Kusonoki, 1997; McLaughlin *et al.,* 2005
Incremental	Improvements to existing technologies, products and/or services, which are focused on the current markets.	Gopalakrishnan and Damanpour, 1997; Wolfe, 2007; Carlisle and McMillan, 2005; OECD, 1994; Garcia and Calantone, 2002; Tidd and Bessant, 2009; Von Stamm, 2003
Organisational	The usage of managerial as well as working practices and concepts.	Gopalakrishnan and Damanpour, 1997; Wolfe, 2007; Armbruster *et al.,* 2008; Gera and Gu, 2004; OECD, 2005; Murphy and Simon, 2002; Uhlaner *et al.,* 2007
Technical	The adoption of technologically improved or new productions methods pertaining to delivery of products.	Gopalakrishnan and Damanpour, 1997; Wolfe, 2007; OECD, 2005; Phillips, 1997
Administrative	Changes to the administrative process or structure of the organisation.	Damanpour and Evan, 1984; Phillips, 1997
Product	A product or service which is new or has been drastically improved, to meet the newer specifications and characteristics.	Edquist *et al.,* 2001; Un *et al.,* 2010; OECD, 2005; Kock *et al.,* 2011;Bohlmann *et al.,* 2012
Process	The discovery of a new method or process for goods and service production.	Damanpour, 1991; Egbu, 2004; Tidd and Bessant, 2009

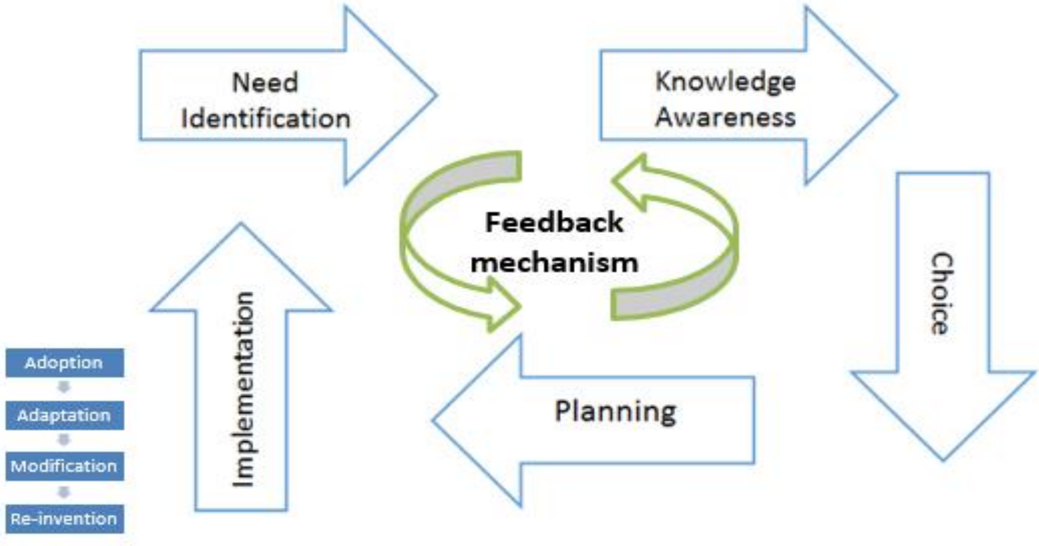
Source: The researcher.

2.5 Main Stages of the Innovation Process

The objective of this section is to examine the importance of the innovation process, to identify its main stages and to examine the main factors for the successful implementation of innovation. Hartley (2006) puts forth the argument that stages assist in conceptualization of the innovation process, as well as determining where barriers and drivers occur. The innovation process is a combination of a number of stages or stages, which sequence can be anticipated (Rogers 2003; Zaltman *et al.,* 1973: p.52). According to Ram and Pattinson (2009), there is no globally accepted subdivision and nomenclature for the stages of an innovation process. For Jacobs and Snijders (2008), the innovation process is the development as well as selection of ideas for the innovation process, and the subsequent transformation of ideas into innovation. Cooper (1980) explains the stages as one or more decisions and related behaviour which are connected in some logical fashion and which move the process toward subsequent decisions. This means that the process of innovation consists of "a series of decisions and actions taken at different times with respect to choice and implementation of a new idea" (Saad, 2000: p. 22).

Rogers (1983), in describing diffusion of innovation theory, proposed a five-stage model of innovation adoption and implementation: knowledge (innovation awareness), persuasion (attitude towards the innovation), decision (adoption or rejection decision), implementation (innovation actual use) and confirmation (innovation decision evaluation). Saad (2000: p. 24) claims, "innovation is dynamic and depends on interactions and feedback mechanisms with internal and external environment". Moreover, Saad (2000) identifies the five main stages of the innovation process, which are identification of the need to innovate, developing awareness, selecting the innovation, planning and implementation. The implementation stages consist of four sub-stages: adoption, adaptation, modification and re-invention. Saad’s (2000) module is adopted in this study, since it provides a compressed view of the innovation process. Figure 2.1 depicts the main stages of innovation identified by Saad (2000: p. 24-28).

Figure 2.1 Main Stages of the innovation process



Source: Saad (2000). Used with permission of the publisher. Intellect Limited, PLSclear Ref. No: 5380.

First stage: identification of the need to innovate. The main aim of this stage is to identify and define the needs in order to better focus the awareness activities (i.e. acquisition of new knowledge with regards to the effective implementation of the innovation) and hence minimise the risk of making an incorrect decision. This, can help identifying and considering different possibilities (Nooteboom, 2001; Mulgan and Albury, 2003; Jacobs and Snijders, 2008). Jones and Saad (2003) have the opinion that innovation, or the need of it, is very rarely a result of single motives, but the aftermath multiple concurrent motives. This particular stage determines the failure or success of other innovation stages. The identification process should focus on external and internal factors, such as social and economic factors, and in-house capabilities.

Second stage: developing awareness. The aim of this stage is to gain a greater understanding and awareness related the effective implementation and use of the new idea, with the view of minimising the inhibitors of implementation and ensuring success. It springs into motion just as the first piece of information regarding a new idea enters the organisation. The aim here is to acquire understanding, information and knowledge of the functioning principles and key features of the new idea, along with their suitability towards the need for innovation. This can be deployed through research, training and feedback. It consists of a thorough integration of all the issues in innovation, such as new ideas, technology, culture, economics, etc. If adequate levels of information and understanding are not gained, other stages are likely to be adversely affected. An incorrect decision will lead to incompatibility between the new idea and the need to innovate as identified by the organisation.

Third stage: selecting the innovation. This stage of selecting innovation aims to perform a situational evaluation and a comparison of innovative alternatives by exploring their strengths and weaknesses. In this stage, the primary objective is to accumulate data which will reveal the weaknesses and strengths of the innovation, in order to determine the method by which it can be best introduced into any given scenario. An appropriate identification of the need and a greater awareness with regards to both the new idea and the context in which it is going to be implemented will facilitate the choice. Alternative innovations are evaluated, compared, and listed based on their primary characteristics. During this particular stage, organisations are generally prepared to make decisions, regarding which projects to pursue and which to neglect (Rogers, 1996; Nooteboom, 2001; Tidd and Bessant, 2005; Jacobs and Snijders, 2008).

Fourth stage: Planning. This stage is required for effective transitions between the conceptual activities identified in stages 1, 2 and 3, and in the implementation stage, where the innovation is enacted. This stage aims to ensure the appropriateness of innovation to "the context in which it is going to be operated" (Saad, 2000: p. 26). It is important for anticipating the events that are likely to occur, and to ensure the best fit between the selected innovation and the context in which it is going to operate.

Final stage: Implementation, this stage aims to implement the selected innovation. This stage, which will be further discussed, is increasingly seen as being at the heart of successful innovation (Leonard-Barton, 1990; Voss, 1991, in Jones and Saad, 2003: p. 155).

To summarise, this section has examined and discussed the importance of the innovation process and has identified the main stages of innovation implementation. This study adopts Saad’s (2000) model of innovation process, since it provides a compressed view of the innovation process. These five main stages of the innovation process are identification of the need to innovate, developing awareness, selecting the innovation, planning and implementation. The implementation stages consist of four sub-stages: adoption, adaptation, modification and re-invention. Table 2.3 provides summery of these stages identified.

Table 2.3: Summery of main stages of innovation implementation

Stages	Definition	Selected sources
Needs intensifications	To recognise and define the needs, to minimise risks of wrong decisions.	Saad, 2000; Jones and Saad, 2003; Nooteboom, 2001; Mulgan and Albury, 2003; Jacobs and Snijders, 2008
Knowledge awareness	To gain better awareness and understanding of the new concepts, with the purpose of minimising implementation inhibitors, while ensuring success.	Saad, 2000
Selecting the innovation	The performance of a situational evaluation, as well as comparison of alternatives which are innovative, through the exploration of strengths and weaknesses.	Saad, 2000; Rogers, 1962; Nooteboom, 2001; Tidd and Bessant, 2005; Jacobs and Snijders, 2008
Planning	To visualise activities which have been identified I the first three stages, as well as the stage of implementation, where innovation gets enacted.	Saad, 2000
Implementation	To implement the innovation which has been selected.	Saad, 2000; Leonard-Barton, 1990; Voss, 1991, in Jones and Saad, 2003

Source: The researcher

2.6 Innovation Implementation

This discussion on implementation will be drawn from the innovating literature (Rogers, 1983) and information system literature (Delone and McLean, 1992). Innovation implementation has been extensively researched over the past two decades (Saad, 2000; Tidd and Bessant, 2011; Leonard-Barton, 1985; Rogers, 1983; Rice and Rogers, 1980; Van de Ven, 1993; Klein and Sorra, 1996; Klein and Knight, 2005). This reflects the significance of the implementation stage as a ''critical gateway between the decision to adopt the innovation and the routine use of the innovation"

(Klein and Sorra, 1996: p. 1057). The implementation stage is the heart of the innovation process (Leonard-Barton, 1988 and Saad, 2000). Table 2.4 illustrates some definitions of innovation that highlights the importance of the implementation of innovation.

Table 2.4: Summary of definitions of innovation involving the implementation of a new idea.

Definition	Selected sources
Innovation involves the implementation of a new idea	
Innovation involves the practical implementation of new products, services and processes, as well as delivery methods, which result in massive improvements in terms of outcome efficiency, quality, and effectiveness.	Mulgan and Albury, 2003
Innovation, as an act, is not single or instantaneous, but an entire sequence of events which occur over the course of time, and which involve all the trademark activities of introducing a product or process into the market.	Jones and Saad, 2003
It is creating a new product, service of process and subsequently introducing it into the market.	Brown *et al.,* 2004
It is the creation, general acceptance and implementation of fresh ideas, products and services, for the very first time inside an organisational setting.	Aiken and Hage, 1971
It is the practice of turning new opportunities into ideas, and then using them widely.	Tidd *et al.*, 2005
Innovation is not, as commonly assumed, a singular action. Rather, it is a process which consists of various related sub-processes. It is not the generation of a new idea, nor its it the invention of a device, nor even a new market development. The process of innovation is actually all of the aforementioned collaborating in an integrated manner.	Trott, 2012
A joint, open-ended activity, with the purpose of creation, as well as implementation of new and appropriate products and processes, with the aim of generating economic benefit, among other values.	Oddande, 2008

Source: The researcher

Innovation implementation has been defined by Klein and Sorra (1996) as a process of obtaining the committed and appropriate employment of an innovation by targeted employees in a firm. They also assert that the failure of a firm to attain the intended advantages of innovation may reflect an implementation failure or an innovation failure in itself. However, Klein and Sorra (1996) view implementation as the transition period in which targeted organisation members ideally turn into skilful, committed and consistent users of an innovation. This view is also in line with Rogers' (2003) view for whom, it is only the period of transition, which is followed by the decision to adopt a particular innovation; a duration in between which the intended users put the innovation to regular use (Rogers, 2003).

For Van de Ven *et al.* (1989), implementation is viewed as the successful development of the innovation in the organisation as determined by the perceptions of the participants. Dougherty and Hardy (1996) describe the process of innovation implementation in organisations as being complex, non-linear, eclectic and suffering from a lack of connectedness. This complexity of innovation implementation is much more visible in organisations with scare resources, a lack of skills, outright scepticism towards formal training, a need for operational flexibility, as well as a lack of systematic measurement (Freel, 2000; Vossen, 1999). Jones and Saad (2003) suggest that the process of implementation must have a link with the background of the organisation as well as culture, so that compatibility and success can be ensured. The innovation implementation process is explained by Saad's (2000) model of the innovation implementation that consists of four sub-stages of innovation implementation. These sub-stages are adoption, adaptation, modification and re-invention.

Furthermore, implementation is an essential part of the adaptation process, as "it leads to the successful adoption of the innovation and in which the user or the recipient of the technology is supposed to be actively involved" (Saad, 2000: p. 27). Therefore, users' involvement in ERP implementation, as recipients of technology and ultimately the innovation's recipients should be encouraged and enforced to ensure the successful adoption of an innovation.

Saad (2000: p. 27) emphasises that the successful implementation of innovation depends on the "level of compatibility between innovation and its environment". This compatibility consists of three elements: first, adaptation, which concerns dynamic change through continuous fitness between innovation and its environment; second, modification, which concerns the ability to alter innovation through training and learning; and third, re-invention, which refers to "alteration of the original innovation to suit users' needs" (ibid: p. 26). Additionally, he emphasises (ibid: p. 28) that the successful implementation of innovation comes as a result of ‘’accurate and adequate conceptual work, greater interaction with other stages of the innovation process, early involvement of the user, continuous organisational learning, a systematic approach, a multidisciplinary approach, and managing implementation in an integrated way’’. Klein *et al.* (2001) stated that many new systems are unable to succeed due to implementation failure. The main stages of ERP will be discussed in detail in Chapter Three.

2.7 Information Systems and Innovation

As mentioned in previous sections, the "innovation" phenomenon is strongly associated with newness (Rogers, 1995; Zaltman *et al*., 1973; Damanpour and Evan, 1984) and implementation (Tidd *et al*., 2005; Mulgan and Albury, 2003; Jones and Saad, 2003), leading to value creation (West and Farr, 1990; Grawe *et al*., 2009; Kim *et al*., 2006). IS innovations are therefore used to introduce a new approach or a new technology aimed at helping the unit of adoption to improve its performance and create value. This is why, businesses from different sectors largely use innovation in IS in order to enhance and sustain their performance. It is also addressed by an increasing body of literature (Hansen and Nørup, 2017; Moon *et al*., 2014; Wiredu, 2012; Jonghak, 2017; Ananda, 2002; Chae *et al*., 2014; Mithas *et al*., 2012; Bloom *et al*., 2014; Drnevich and Croson 2013; Franssila *et al*., 2014). Avgerou (2002: p. 64) defines IS innovation as “IT innovation and organisational change, whereby both the IT items and the individual organisational actors involved are part of institutionalised entities, which are historically formed durable, but dynamic, heterogeneous networks”. This definition explains IS innovation by highlighting the interactions between the networks of heterogeneous actors involved in the innovation. This heterogeneity, in the network, is represented by a number of actors such as hardware, software, data, IT developers, vendors, users and consultants (Lanzara, 2009).

IS innovations can be utilised to enhance business processes by implementing systems that integrate business functions and by integrating data and processes along the various links in the value chain, either for internal operations or the external marketplace (Broadbent *et al.*, 1999). According to Chaveesuk (2010), information systems (IS) can be considered as a technological innovation, where the IS implementation in the user organisation is considered to be an innovation process (Slaughter, 1993; Hyötyläinen, 1998; Amoako-Gyampah and Salam, 2004) to enhance the efficiency or effectiveness of IS function. Besides, they can be used to enhance, and to integrate IT into core value chain activities and business strategies that directly affect a firm's financial performance (Swanson, 1994). Moreover, Wang *et al.* (2014: P.72) regarded the IS as forms of social action; they stated that ''Modern society is a society of information, in which ICT has become an important part of the social structure''. Avgerou and McGrath (2007) suggested that IS innovation should not be based only on technical and rational perspectives. It should be concerned about the value, benefits and power of the IS for different groups. Therefore, the impact of IS on organisations should analyse its impact on different external groups rather than focusing on the internal quality of the system (Wang *et al.,* 2014). Kim *et al.* (2006), on the other hand, claim that IS innovation can be used to enhance organisations' resources. According to the Resource Based Value concept (RBV), organisation resources include "all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney 1991: p. 101). Resources in organisations can be classified into three types of capital: physical, human, and organisational (Barney 1991). The RBV suggests that resources are usually distributed heterogeneously and are not perfectly mobile across firms (Nason and Wiklund, 2018; Hatch and 2004; Barney 1991), which can be a source of sustainable competitive advantage (Lewandowska, 2015; Halawi *et al.,* 2005).

2.8 Information Systems Implementation

The risk and cost of failure of IS innovation have pushed practitioners, academics, and policymakers to place a greater emphasis on better understanding the implementation of such complex and costly innovations. This explains the important body of literature focusing on the key success factors of the implementation stage. In a number of studies, the adoption of the information system is viewed in the broader context of organisational change (Burns and Stalker, 1994; Edwards, 2000; Doherty *et al.,* 2003). The IS implementation can cause fundamental changes that represent revolutionary and radical innovation changes in technology, which IS implementation brings to the implementing organisations (Dewar and Dutton 1986). Therefore, information technology is usually seen as one of the most influential forces providing input into the process innovation (Davenport, 1993; Bagchi *et al.,* 2003; Bhatt *et al.,* 2010). Researchers often make a clear distinction between radical and incremental innovations in the implementation of information systems (Capaldo and Rippa, 2009; Davis and Hikmet, 2008; Tushman and Nadler, 1986; MacDonald, 1998; Benediktsson and Dalcher, 2003).

A successful IS implementation can result in higher operational efficiency, an improved business process, and in most cases a lower cost for the organisation (Ahmed and Khan, 2013; Rabaa, 2009; Abbas, 2011). According to Coakes *et al.* (2004), the successful development and implementation of Information systems depend on both the technical and the organisational alignment, i.e. the socio-technical combination. While a failed implementation, however, may result in a negative impact on the organisation, employees, and investors (Ahmed and Khan, 2013; Rabaa, 2009). This failure could decrease the level of operational efficiency and an increase in the cost of implementing the new system (Yeo, 2002). Hyötyläinen (2013) emphasised that the implementation of information systems is a significant challenge and a source of problems in most organisations. Most organisations face some major difficulties in implementing information systems and, particularly, in trying to use all the properties inherent in the systems (Sauer, 1999; Wu *et al.,* 2007; Snider *et al.,* 2009). The implementation of IS system, according to Beynon (2009) has two major aspects which include: (1) the technical solution of IS systems such as analysis, design, and construction of the system and (2) the organisational factors such as user involvement in the implementation process.

Organisations have not always been successful in managing the changing demands of information systems (IS) from the self-contained business support units of the sixties to the distributed strategic business functions of the nineties (Selig, 1991, Hasan and Cheung 1993). Organisations continually face the trade-off between IS processing power, human effort, and different investment decisions in order to best meet organisational objectives and opportunities (Galliers 1993). Loonam *et al.* (2014) confirm that despite IS's progression and growth in 'strategic' importance for modern organisations, empirical evidence reveals that challenges abound when implementing such systems into the organisation. Loonam and McDonagh (2004) claim that incidences of underperformance and failure in IS implementation are as high as 90%. Loonam *et al.* (2014) confirm that up to 50% of IS initiatives being abandoned or failing outright and up to an additional 40% of IS initiatives being delivered late and over budget. Further, they suggested that in order to effectively introduce IS into organisations, there is a need to foster a highly systemic approach to organisational change to be able to integrate the many complex facets relevant to organisations and IS, in particular, the integration of human and technical aspects of change. Therefore, the implementation of information systems within an organisation is a process that is not easy to handle. It is widely recognized that the implementation of information systems is a serious organisational problem (Loonam *et al.,* 2018; Almalki *et al.,* 2017; Hansen and Nørup, 2017; Hawking, 2007; Vayyavur, 2015; Wanare and Mudiraj).

A number of IS implementation models have been proposed to address what is needed for successful IS implementation. For instance, Kwon and Zmud (1987: P.233) proposed a multi-stage model of IS implementation, their widely tested model suggests that the adaptation of IS organisational innovation follows six stages, including initiation, adoption, (development/installation), acceptance, use, and incorporation. They identified five major contextual categories of factors that have impact on technology: user community, organisation, technology, task, and organisational environment (Kwon and Zmud, 1987). They asserted that these factors would be associated with each stage of implementation (Cooper and Zmud, 1990). Cooper and Zmud's (1990) IT Implementation Process was built on Kwon and Zmud's (1978) model of the IT Implementation Process. Cooper and Zmud's (1990) new model is based on the organisational change, innovation, and technological diffusion literature. The aim of the model is to offer a directing and organising framework for

ICT implementation research. On the other hand, DeLone and McLean's (1992) IS success model categorised success measures into six major categories: system quality, information quality, use, user satisfaction, individual impact, and organisational impact. These categories are interrelated and interdependent and provide a comprehensive view of IS success. Subsequent development of this model, however, has led to the addition of dimensions such as service quality, intention to use and Net benefits (replacing organisation impact construct) (Delone and McLean 2004). In addition, based on the Theory of Reasoned Action (TRA), Davis (1989) in his Technology Acceptance Model (TAM) presented a theoretical model aiming to predict and explain ICT usage behaviour, which causes potential adopters to accept or reject the use of information technology. Fishbein and Ajzen (1975) developed TRA to define the links between the beliefs, attitudes, norms, intentions, and behaviours of individuals. This theory assumes that a person's behaviour is determined by the person's behavioural intention to perform it, and the intention itself is determined by the person's attitudes and his or her subjective norms towards the behaviour. In addition, more theories are used to understand and predict the most effective factors that determine the successful implementation of IS systems. The Theory of Reasoned Actions (TRA), which originates from social psychology, is a special case of the Theory of Planned Behaviour (TPB) (Ajzen, 2012) and is another example of theoretical models that are used in IS implementation. Venkatesh *et al.* (2003), reviewed IS implementation models, the Unified Theory of Acceptance and Use of Technology (UTAUT) in order to explain a user's intentions to use ICT and the subsequent user behaviour. This model considers four constructs as direct determinants of user acceptance and usage behaviour, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition, there are four key moderating variables: gender, age, experience, and voluntariness of use. Venkatesh *et al.* (2003) claim that that UTAUT provides a tool for managers to assess the likelihood of success of technology introductions and to understand the drivers of acceptance in order to design interventions, which include, e.g., training or marketing. However, Venkatesh *et al.* (2008) in investigating the relationship between intention and use behaviour found that the facilitating condition is not able to capture the effect of external factors of user acceptance and usage behaviour.

From the above discussion, it is clear that the issue of IS innovation adoption and usage is an essential and long-standing research question which can be considered as a prime topic for IS research (Chan *et al.,* 2010). Although many IS researchers have attempted to improve IS adoption theory to better explain IS adoption behaviour and predict the essential factors for implementation success. These theories still have limitations (Venkatesh *et al.,* 2008) with most of the individual theories being criticised for being fragmented. Cleary, the stream of research still lacks a cohesive model that accounts for the numerous factors that influence technology use and success (Straub, 2009).

2.9 Key Factors for the Successful Implementation of Innovation

This section aims at investigating and identifying the key factors for the successful implementation of a complex system of innovation. The success of innovation relies on the ability of an organisation to execute a creative combination or integration of two or more success or enabler factors (Saad, 2000). Moreover, Saad states that "factors associated with successful innovation can easily be implemented by other firms regardless of the dissimilarities which may exist", and that the "understanding of user needs, good communication and effective collaboration tend to be strongly associated with the success of innovation" (Saad, 2000: p. 31), although he warns against" generalisation which does not correspond to reality, especially to that of organisations in developing countries" (Saad, 2000: p. 30-31). These factors include the factors that affect the diffusion and implementation of innovation, the importance of learning, the need for an organisational culture that support the development and implementation of innovation.

2.9.1 Diffusion of Innovation

This section will explore the factors affecting the diffusion and implementation of innovation in order to investigate what is required for a successful diffusion and implementation of an innovation such as ERP. Earlier research shows that innovation attributes are major factors accounting for the adoption/non-adoption agreements or organisations or individuals (Tornatzky and Klein, 1982; Al-Ghatani, 2003). Empirical studies illuminated a variety of primary factors which can influence decisions for adoption, including characteristics of innovation (Ndubisi and Chukwunonso, 2005), size of the organisation (Damanpour, 1992), structural complexity of the organisation (Damanpour, 1996) recognised innovation implementers (Beath, 1991), as well as competitive pressure (Premkumar and Ramamurthy, 1995).

Rogers (1983) has provided an amalgamation of more than 3,000 previously completed studies regarding adoption, as well as diffusion. There were a number of generalisations, which emerged as a result of this amalgamation. They include the process by which innovations spread through masses of potential adopters. Following are some of the most common and prevalent generalisations:

- Innovations have particular characteristics, such as compatibility, relative advantage, complexity, observability, and trialability, which, as seen by the adopters, decide the pattern and rate of adoption.
- Some adopters themselves are more innovative, as compared to others, and may be identified by their own personal qualities (level of education, cosmopolitanism etc.).
- The decision for adoptions commonly unfolds like a series of phases (starting from the knowledge of the innovation, and through to persuasion, then decision, and implementation, and finally confirmation.
- Adopters are also biased towards various different types of influence, such as mass-market communication, and word-of-mouth, at various stages.
- The practical movements of certain individuals, including change agents, champions and opinions leaders, have the ability to quicken the process of adoption, especially when potential adopters see individuals such as the aforementioned as similar to their own selves. The process of diffusion starts gradually among the initial adopters, reaches a quicker pace (a veritable take-off mode) as the community of adopters develops, as the influence peers,

with its effects, are finally realised. This process then levels off due to the potential adopter population becoming exhausted, thereby resulting in an 'S-shaped' adoptions curve.

The diffusion of innovation can be defined as a process in which new ideas, concepts and/or technologies have been introduced, and commercialised through a number of channels spread over a social system, and adhering to a certain time period (Rogers, 2003). Research on innovation diffusion has progressed, from special focus on variables which affect the adoption or non-adoption of IT (Tornatzky and Klein, 1982) to the diffusion of IT (with regards to the implementation extent) within organisations (Premkumar *et al.,* 1994). More recently, this applies to organisational learning (Fichman and Kemerer, 1997) and performance (Ramamurthy and Premkumar, 1995) that may branch out from IT movements.

Rogers (1985) explains that the adoption rate is measured by the extent of time needed by a certain portion of system members to adopt innovation. According to Rogers (1983, 1995) there are five qualities which can affect the rate of diffusion and adoption of innovation. They are; compatibility, relative advantage, complexity, trialability and observability. He claims that, "each attribute is described as being somewhat empirically interrelated, while remaining conceptually distinct" (Rogers, 1995: p. 11). The following paragraphs will clarify Rogers' (1983; 1985; 1995) attributes.

First: relative advantage, Rogers (1983: p. 13) defines relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes". This clearly shows the link between innovation and value creation. These value creations (relative advantage) can be achieved through reducing costs, improving business knowledge, creating new and appropriate services, etc. Moreover, innovations that are perceived by individuals as possessing greater relative advantage, compatibility and the like display a more rapid rate of adoption (Rogers, 1985).

Second: compatibility, it represents the extent to which an organisation is sensible to customers' needs and requirements and its ability to satisfy them. Rogers (1983: p.

11) explains that compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters". An idea that is more compatible fits more closely with the environment and context in which it is introduced. It is therefore crucial that new ideas, techniques or processes embedded in ERP are compatible with the specificities and capabilities of businesses. Rogers (1996) suggests that the compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. The compatibility of the system with business requirements is also an important factor that affects ERP adoption (Basoglu *et al.,* 2007; Chang *et al.,* 2008; Kostopoulos *et al.,* 2004) and more particularly in a developing country. As an ERP system is built on best practice assumptions, its implementation sometimes requires companies to adapt their business to fit the system (Davenport, 1998).

Third: complexity, for Rogers (1983: p. 12), complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use". Simple ideas that are easy to understand may present the opportunity for rapid implementation, while more detailed innovation which needs newer understanding and skills may lead to the complexity if implementation increasing, along with the uncertainty factor (Jones and Saad, 2003). This view of complexity is echoed by Premkumar *et al.* (1994), who state that new ideas that are easy to understand and assimilate have the potential to be adopted at a greater pace, as compared to innovations which require adopters to accumulate new skills, knowledge and understanding. Therefore, the perceived complexity of the new technology with existing systems is also anticipated to affect the adoption decision and the implementation process.

As suggested by Rogers (1995), more complex systems and technologies, which require a high level of capabilities and absorptive capacity (Cohen and Levinthal, 1990) can decrease the chance of adoption and successful implementation of ERP in businesses from developing countries such as Saudi Arabia. According to Volkoff (1999) and Poston and Grabski (2001), companies often encounter difficulties while integrating ERP software with operating systems, hardware, telecommunications and database management systems. ERP systems include numerous features, modules and users that need to be considered carefully when implementing the system

(Hossain *et. al.,* 2002; Markus and Tanis, 2000). Furthermore, cross-module integration and data and process standardisation add to the complexity of these systems. As ERP systems include various features and modules, users need to consider carefully and implement only those features that they need (Hossain *et. al.,* 2002).

Fourth: trialability, which importance stems from its role in decreasing the level of uncertainty and risk, which are significant features of innovation. Rogers (1985: p. 13) states that trialability is "the degree to which an innovation may be experimented with on a limited basis". Additionally, he suggested that the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption (Rogers, 1985). This trial is a means to dispel uncertainty about the new idea. According to Martin and McClure (1983) and Kunda and Brooks (2000), experimentation within the operation environment, within which the product is to be used, is the best method of evaluating packages. This means that potential adopters will feel more comfortable with the innovation, if they are provided the opportunity to experiment with it, and gain a better understanding of the factors for its successful implementation (Leonard-Barton and Deschamps, 1988; Davis *et al.,* 1989).

Finally: observability, the observability characteristic reflects the degree to which the results of an innovation are visible to others (Rogers, 1983). This includes the process of searching for new markets, new products and/or services, identifying new customers' needs or developing existing needs. Rogers (1995) presents an example of computers’ software components to elaborate on innovation observability. He presents the argument that a technological innovation’s software component is not very apparent for observations, therefore innovations which have a more dominant software aspect, are not as visible, and thereby possess a rate of adoption that is slower.

The innovation’s observability, as seen by members of any social system, pertains to the rate of adoption. Al-Gahtani (2003) while studying diffusion and computer adoption where software (applications and operating systems) make for the dominant portions of such innovation within Saudi Arabia, discovered that observability harbours a strongly positive relationship with computer usage and adoption. Thus, the greater the observability and the possibility to early address problems, the better is the chance to successfully implement the new idea/technology such ERP.

To summarise; according to Rogers (2003), innovations that offer more observability, relative advantage, trialability, compatibility, and lesser complexity, are considerably easier to adopt and implement successfully. If the potential adopters observe the innovation to contain compatibility with their needs and practices, and relative advantage, innovation diffusion can be made quicker. All these attributes, except complexity, have a positive relationship with the rate of adoption of information systems (Rogers 1995; 1985; Zaltman *et al.,* 1973) and therefore be relevant to the successful implementation of ERP system.

2.9.2 Learning and Knowledge Sharing

This section discusses the importance of learning as a crucial condition for the implementation of innovation such as ERP. Learning and development are often identified as key elements in organisational improvement (Camps and Luna-Arocas, 2012). A large body of innovation literature (Saad, 2000; Tidd and Bessant, 2011; Leonard-Barton, 1985; Rogers, 1983; Rice and Rogers, 1980; Van de Ven, 1993; Klein and Sorra, 1996; Klein and Knight, 2005; Alegre and Chiva, 2013, 2008; Jiménez-Jiménez and Sanz-Valle, 2011; Dodgson, 1993; Al-Debei and Al-Lozi, 2012) argues that the ability of businesses to innovate largely depends on their capacity to effectively learn (Saad *et al.,* 2017; Manolova and Edelman, 2016). Innovation requires that individuals acquire existing knowledge and share this knowledge within the organisation. For Hsu and Fang (2009), organisational learning positively affects the innovation. Calantone *et al.* (2002) and Alegre and Chiva (2008) claim that organisational learning is described as one of the factors that precede the innovation. Jiménez-Jiménez and Sanz-Valle (2011) emphasise that organisational learning, innovation and performance are interrelated factors. According to Mahmood (2000), users play an important role in ERP implementation success. They therefore have to understand and learn about the ERP system in order to support and facilitate its implementation which might be influenced by how the users behave or how they carry out their work (Wang and Chen, 2006). Moreover, the ability to access and effectively use knowledge is at the heart of absorptive capacity (Cohen and Levinthal, 1990; Zahra, Filatotchev and Wright, 2009).

The concept of absorptive capacity highlights the crucial importance of developing internal knowledge-based resources in terms of human resources competences and capabilities, such as numbers and types of qualifications, skills, experience, training, etc. Many articles place a significant emphasis on the links between absorptive capacity and organisational learning (Scuotto *et al.,* 2017; Saad *et al.,* 2017; Yoo *et al.,* 2016; Gutiérrez *et al.,* 2012; Zahra and George, 2002). The concept of absorptive capacity is described as complex (Saad *et al.,* 2017), crossing different areas of management (Volberda *et al.,* 2010) and involving interactions between different organisations (Liu, 2015). A number of similar definitions for absorptive capacity can be found in many studies (e.g. Mowery and Oxley, 1995; Kim, 1998; Zahra and George, 2002; Cohen and Levinthal, 1990; Christensen *et al.,* 2005; Aldrich, 1977). Cohen and Levinthal's (1990: p. 128) widely used definition of absorptive capacity is "the ability of a firm to recognise the value of new external information, assimilate it and apply it to commercial ends". Zahra and George (2002) expanded the most commonly used definition by Cohen and Levinthal (1990) and defined absorptive capacity as "a set of organisational routines and processes by which organisations acquire, assimilate, transform, and exploit knowledge to produce a dynamic organisational capability", which is "pertaining to knowledge creation and utilization that enhances an organisation’s ability to gain and sustain a competitive advantage" (Zahra and George, 2002: p. 185). According to this definition, knowledge must be acquired internally and/or externally, absorbed, assimilated , converted and modified to most effectively suit the organisation’s own needs, and subsequently employed and exploited . According to Volberda *et al.* (2010), absorptive capacity undoubtedly improves innovation outcomes (quality, speed and frequency).

Furthermore, absorptive capacity is vital to elaborate on why some companies excel over others, in terms of learning, creation and value-capture from technology that has been in-sourced, and developed externally; as well as collaboration with partners in innovation (Vanhaverbeke *et al.,* 2007; Cassiman and Veugelers, 2006; Volberda *et al.*, 2010). Cohen and Levinthal (1990) argued that a company's ability to exploit outside sources of knowledge is essential for an organisation to be innovative. They further suggested that a company's ability to use external knowledge is mainly a function of the company's level of prior related knowledge, which "is necessary in order for an organisation to recognise the value of new information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990: p. 128).

In addition to that, the absorptive capacity's primary premise is that previously accumulated knowledge is required to acquire and use new knowledge (Cohen and Levinthal, 1990). Additionally, Cohen and Levinthal (1990) visualised the interactive and relational nature of absorptive capacity, within the notions of exploiting and assimilating new knowledge, which has been derived from existing knowledge (Van den Bosch *et al.*, 2003; Zahra and George, 2002).

To be certain, existing knowledge allows for the accumulation and exploitation of newer knowledge to the point where a portion of the existing knowledge within a firm, acts as a bridge between the existing knowledge and the accumulated knowledge. Hence, without prior and accumulated knowledge it is not possible to interpret and evaluate what is different and original in the new. Therefore, absorptive capacity accumulated over a period of time permits more efficient accumulation in the following period (Cohen and Levinthal, (1990). Furthermore, in order to maintain high level of absorptive capacity, the knowledge acquired through various sources needs to be documented, hence, codified (Zahra and George, 2002; Levinthal, 1990; Gupta *et al.,* 2009). The codification of knowledge is a vital tool for innovation and work improvements, It is the conversion and transformation of knowledge from the tacit and personal stage to the explicit stage through systematic ways of writing procedures, manuals, and digital databases. The objective here is not only to document knowledge for dissemination and future use only, but also to improve the understanding of the new knowledge. (Nonaka, 2000; Zollo *et al.,* 2002).

Organisational learning determines how firms acquire and exploit external and internal knowledge. This means that the accumulated knowledge explains and reflects on the organisational learning nature within an organisation. Additionally, organisational learning is also a reference to an organisation's ability to implement proper structure, procedures, management practices, as well as policies which serve to facilitate and foster shared learning (Goh, 2003). Subsequently, organisational learning as a concept, which consists of organisational and managerial characteristics that facilitate the sharing of learning and the transformation of individual learning to collective learning (Chive *et al.*, Goh and Richards, 1997). It can prove necessary for implementation of ERP.

Learning dimensions

A number of studies have identified a multidimensional construct that facilitates the learning process (e.g. Alegre and Chiva, 2008; Goh, 2003; Jerez-Gomez *et al.,* 2005). According to Peddler *et al*, (1997) there are a set of acts which ensure learning capability. These acts include continuous improvement, experimentation, group-based problem solving and teamwork. Jerez-Gomez *et al*, (2005) identify four vital aspects of organisational learning ability. They are systems perspective (Jerez-Gomez *et al.*, 2005) managerial commitment (Goh, 2003; William, 2001), integration and transfer (Hamilton, 2005; Jerez-Gomez *et al.,* 2005), and openness and experimentation (Chiva *et al.,* 2007).

The first dimension refers to managerial commitment to learning (Goh, 2003; William, 2001; Garvin, 1993). This happens when management admits the necessity of learning and forming a culture that advocates knowledge generation and transfer, as basic organisational values (Stata, 1989; McGill *et al.,* 1992; Garvin, 1993; Nonaka and Takeuchi, 1995; Jerez-Gomez *et al.,* 2005). Management is capable of creating a climate where providing feedback, making constructive criticism and empowering employees to make decisions (Goh, 1997). Additionally, management commitment to learning means that management is willing to provide additional resources and implement the necessary changes to foster learning within the organisation.

The second dimension is about openness and experimentation. This dimension refers to the degree to which an organisation is open to new ideas and suggestions (Chiva *et al.*, 2007). Organisations need climates that foster openness to internal as well as external learning resources, to make room for the constant renewal, widening and improvement of individual knowledge (Leonard-Barton, 1992; Sinkula, 1994; Slocum *et al.*, 1994; Senge, 1990). Therefore, Interaction with various other organisations, as well as external linkage, is very advantageous towards organisational learning. These are understood as factors which influence organisations.

An organisation's external factors are defined as being outside the realm of control (which determines the risks and opportunities) of the organisation. It can involve elements of an industrial nature, such as suppliers and competitors, as well as the economic, social, legal and political systems (Jerez-Gomez *et al.,* 2005; Chiva *et al.,* 2007; Sinkula *et al.,* 1997; Leonard-Barton, 1992). Additionally, problem solving and discussion can potentially create innovative ideas, granted that organisations can foster an environment in which issues and problems are discussed creatively and freely (Menon, 1995; Chiva *et al.,* 2007; Goh and Richards, 1997; Robbins *et al.,* 2003; Dobni, 2008).

Therefore, openness and experimentation are considered critical dimensions within organisational learning capability (*Nevis et al.,* 1995; Weick and Westley, 1996). This culture of openness and experimentation needs to allow ideas to be renewed, expanded and continuously enriched (Akgun *et al.,* 2007). To create the aforementioned climate, there has to be an already existing commitment to functional and cultural diversity, alongside an open acceptance of all manner of experiences and opinions, with a drive to learn from them. This is while negating the egocentric practice of considering one's own beliefs, values and experiences to be superior, over those of others (McGill *et al.,* 1992; Nevis *et al.,* 1995; McGill and Slocum, 1993). For an ERP system, implementation success can be dependent on its adequate appropriation (Boudreau, 2003). This indicates the importance of the organisation's openness and experimentation in users' understanding of software such as an ERP system.

Systems perspective as the third dimension as suggested by Jerez-Gomez *et al.* (2005), consists of bringing the members of the organisation together, based on a central identity (Senge, 1990; Sinkula *et al.*, 1997; Sinkula, 1994), while also embracing a shared vision and mutual identity. It also involves building relations and connecting members with each other by way of exchanging knowledge and information (Akgun *et al.,* 2007). The various different people, areas and departments of the firm, need to have a clear visual of the goals of the organisation, and know how they can aid with the development of said goals (Jerez- Gomez *et al.*, 2005; Hult and Ferrel, 1997). In terms of learning, the systems perspective denotes clarity of purpose, where every employee has a mind-set directed at learning. In addition, it implies that all the divisions within a firm, including employees, departments, teams and management, have knowledge of how they can contribute to achieve the learning objective (Nwankpa and Roumani, 2014). If a shared vision is lacking within an organisation, individual actions may not build the synergy needed to sustain learning capability. Thus, having a shared vision regarding learning within an organisation means moving beyond the employee's individual goal towards a collective and shared vision (McGill *et al.,* 1992). Furthermore, Senge (1990) states that without a common vision, the members of the organisation will most likely be functioning with opposing purposes, since they will not be concurrently seeing the organisation from a holistic point of view, nor will they realise the effect(s) of their decision on fellow members. It also means that they do not have a mental model of what the organisation is or what it needs to be or become (Morgan 1986).

The fourth is about transfer and integration, which represents the degree to which knowledge, ideas and innovations can spread internally through communication channels in an organisation (Hamilton, 2005; Jerez-Gomez *et al.,* 2005). It refers to two closely linked processes, which occur simultaneously rather than successively: internal transfer and integration of knowledge (Jerez-Gomez *et al.,* 2005). The efficacy of these two processes rests on the previous existence of absorptive capacity (Cohen and Levinthal, 1990), implying the lack of internal barriers that impede the transfer of best practices within the firm (Szulanski, 1996). The ability to disseminate new knowledge and ideas across departmental and functional boundaries is critical to any organisational success (Nwankpa and Roumani, 2014). Knowledge transfer entails the internal distribution of knowledge, which has been accumulated by a single person, primarily through interactions and conversations among individuals (Brown and Duguid, 1991; Nicolini and Meznar, 1995; Kofman and Senge, 1993), creating communication networks, cross-functional teams and by sharing experience between organisational units (Darr *et al.,* 1995). Hamilton (2005) suggests that organisations that are better equipped in handling knowledge transfer are more effective in gaining competitive advantage.

Additionally, knowledge is always increasing, seeing as current knowledge has a dependency on previously acquired knowledge; giving meaning to developments in the future regarding innovative enterprise direction and dependencies on paths which the organisations can barely escape(McCann and Van Oort, 2009). Demarest (1997) states that cumulative knowledge within organisations results when knowledge is shared by employees in an organisation (Smith and Sharif, 1999). Cabrera and Cabrera (2002) are of the opinion that organisational knowledge, which consists of current as well as former employees' tacit knowledge, is actually a non-tangible strategic asset.

Learning strategies

There is a need for processes and procedures that foster the spread of knowledge and learning at the individual level, departmental level and organisational level. For instance, Ozuah *et al.,* (2001) explain that problem-based learning is self-regulated learning that can enhance the learning experience. This means there is a need to create a friendly environment, where problems and issues can create new and innovative ideas (Goh and Richards, 1997; Senge, 1990). Jerez-Gomez *et al.* (2005) present the argument that the transfer and integration of knowledge are comprised of two processes which are linked closely; namely knowledge integration and knowledge transfer. The process efficacy here is reliant on the previously existent absorptive capacity, which implies the absence of internal barriers that inhibit best practice transfer within the firm (Cohen and Levinthal, 1990). Therefore, learning in organisations needs to be based on effective strategies that can help capture individuals learning and transform a more collective learning.

Learning strategy means the method of conducting training, learning and development, especially with the aid of manoeuvring or stratagems. Abiodun (1999) defines training as the methodical development of the attitudes, skills, and knowledge, which is necessary for the employees to give sufficient performances on a given job or task. This could take place in any number of ways, whether on the job or outside of the workplace. Prior studies identify that organisational learning can be facilitated through number of approaches. These approaches are discussed. First, action learning, where learning is taken from others' experiences of how they relate to real life problems and the origin of actions others take (Rhodes and Shiel, 2007). Learning occurs through the feedback given and the results of problem solving. This type of training include these learning activities and methods such as a) group of peers meeting, b) group discussion and c) experimentation (Miller, 2003; York and Marsick, 2000; Robinson, 2001; Williams, 2001; Dotlich and Noel, 1998; Stata, 1989). Second, active learning (Boyer, 2002; McGoldrick *et al.,* 2000; Salemi 2002; Thomas 1998). Boyer (2002) and Thomas (1998) elaborate that active learning works by permitting the learning process to be implemented through activities such as teamwork, problem solving, small group discussions, case studies, simulations, feedback, brainstorming, writing and reading. Active learning is much more useful for the enhancement of the academic achievements of students, as compared to conventional methods. This is therefore likely to increase the performance scale within organisations (McGoldrick *et al.,* 2000; Boyer, 2002). This type of training include these learning methods: problem solving, teamwork, simulation, casework, small group discussion, brainstorming, reading, writing and feedback.

Third, experiential learning (Hickox, 2002; Gustavsson and Harung, 1994; Fiol and Lyles, 1985). According to Hickox (2002), it is learnt by performing, and can be learned wither inside or outside of the classroom. Learning which is done outside, puts emphasis on practical experiences. It is called on-the-job training. On the other hand, classrooms attempt to simulate the situations, and use case studies and role-playing, as strategies (Geertshuis and Fazey, 2006).

Fourth, cooperative learning (Jenkins *et al.*, 2003; Lancaster and Strand, 2001), it occurs in a learning group such as classrooms and small group learning, because individuals assist others to learn and that are empowered to make decisions that contribute to the groups' success (Jenkins, *et al.,* 2003). The employees are encouraged to decide in ways that bring about success for the entire group. Lancaster and Strand (2001) give the suggestion that cooperative learning promotes greater individual achievement, as compared to individual efforts or competitive approaches.

Fifth, problem-based learning (Ozuah *et al.*, (2001), is basically learning which is self-regulated and usually occurs whenever a team or a group are delegated a task to solve, where each member of the group has to formulate a solution (Ozuah *et al.* 2001).

Sixth, coaching and mentoring, is defined as the process used when the leaders have a desire to help team members improve certain work behaviours and/or skills (Brocato, 2003; Clawson, 1996). Coaching and mentoring are 'one to one' learning processes that give guidance and prepare others to be self-reliant. Hutchinson (2007) states that effective guidance and coaching from the manager always connects with employee commitment, motivation, and satisfaction.

To summarise, this section discussed the importance of learning as a crucial condition for innovation in order to investigate how learning affects the implementation of an innovation such as ERP. Table 2.5 provides summary of the main learning dimensions and strategies that enabler learning in organisations.

Table 2.5: Summarises the main learning dimensions and strategies.

Learning dimensions and strategies		Selected sources
Dimensions	Managerial commitment	Goh, 2003; William, 2001; Garvin, 1993
	Openness and experimentation	Senge, 1990; Leonard- Barton, 1992; Slocum *et al.,* 1994; Sinkula, 1994; Chiva *et al.,* 2007; Goh and Richards, 1997; Dobni, 2008; Robbins *et al.,* 2003; Menon, 1995
	System perspective	Jerez-Gomez *et al.,* 2005; Senge, 1990; Sinkula, 1994; Sinkula *et al.*, 1997
	Transfer and integration	Hamilton, 2005; Jerez-Gomez *et al.,* 2005; Brown and Duguid, 1991; Kofman and Senge, 1993; Nicolini and Meznar, 1995
Strategies	Action learning	Miller, 2003; York and Marsick, 2000; Robinson, 2001; Williams, 2001; Dotlich and Noel, 1998; Stata, 1989
	Active learning	Boyer, 2002; McGoldrick *et al.*, 2000; Salemi, 2002; Thomas, 1998,
	Experiential learning	Hickox, 2002; Fiol and Lyles, 1985; Gustavsson and Harung, 1994

	Cooperative learning	Jenkins *et al.*, 2003; Lancaster and Strand, 2001
	Problem-based learning	Ozuah *et al.,* 2001
	Coaching and mentoring	Brocato, 2003; Clawson, 1996

Source: The researcher

2.9.3 The Organisational and Cultural Arrangements

This section discusses the organisational arrangement and culture that facilitate learning and innovation in order to successfully implement the ERP system. Organisational culture has an important influence on an organisation's innovativeness; the matter of whether tradition or continuous change is the key value in the organisation is of high magnitude (Kanter, 1985). The literature considers organisational culture to be one of the most significant factors in stimulating innovative behaviour among members of the organisation (Valencia *et al.*, 2010). Since the culture of organisation impacts conduct of the employees, it might lead them to consider advancement as a major value of the organisation, and feel more engaged with the business (Hartmann, 2006). Individuals make efforts to adjust to a specific culture, and if changes are expected, the people will be significantly more driven to look for information regarding certain changes and improvements. Cultures that are strong have a tendency to be xenophobic and hesitant towards everything that is unique, often impeding progress, and cultivating inbreeding (Kotter, 2007). These sorts of cultures are harmful towards innovation, especially if the innovation ideas originate from outside the organisation, which is called, "not invented here" (NIH) disorder (Fagerberg, 2004). Moreover, it is agreed upon by all that organisational culture is a huge influencing factor on the inclination of an organisation to develop (Tidd *et al.*, 2015). Since organisational culture additionally influences the impression of the employees regarding the external factors (Oden, 1997), therefore, they are similarly hesitant to absorb and utilize external data since they are not equipped to understand its value. Albeit, they may know about it. Subsequently, these sorts of cultures pretty much rule out the accumulation of outer knowledge sources, especially if such sources challenge established beliefs (Van Den Bosch *et al.*, 1999).

Culture has turned into a vital factor in communication and information technology improvement. It influences all parts of our lives (Hofstede, 1991: p. 170). Nah *et al.*, (2007) makes the claim that organisational culture should advocate interaction sincerity all through the organisation, which includes encouraging the learning process. If not, then employees will either oppose or respond negatively towards ERP usage, resulting in failure.

Tromenaars and Hampden-Turner (1998: p. 6) defines culture as ‘the way in which a group of people solves problems and reconciles dilemmas’. One of the most widely accepted definitions of culture, however, is that of Hofstede (1980: p. 260), who defines culture as ‘the collective programming of the mind which distinguishes the members of one human group from another’. Organisational culture is defined by Williams and Pollock (2009: p. 18) as the ‘’sense of belonging which exists within an organisation where people share a common history’’. It is seemingly the cultural nature existing inside an organisation, which decides the way in which stakeholders of the organisation will respond to new systems, and therefore decide the general success. This is because the changes that result from the implementation of new ERP frameworks are so expansive that they might trigger central changes within organisational culture. This is further talked about by Kuhn and Sutton (2009), who state that organisational culture, and the way through which it is overseen, primarily determines the success of any type of technological change within an organisation.

Culture is learned and cultivated over time. It is a result of experiential and vicarious learning (Bandura, 1977; Schein, 2010) that comes from various interactions between unit members and leaders, while producing sense making (Hartnell *et al.,* 2011). Fichman and Kemerer (1999) expressed that an essential purpose behind the delayed accumulation of an innovation is a lack of knowledge that results in learning barriers. Support for learning may propel innovation execution by making the information and capabilities required for usage, available. Also, by offering a setting in which "employees eagerly take part in experimentation and risk-taking" (Klein and Knight, 2005: p. 245), in this way, indirectly giving time assets to innovation clients (Clayton, 1997). Support for learning additionally pushes employees to reclassify work-related tasks, bringing about the sharing of new ideas, as well as empowering the improvisation essential for viable usage (Orlikowski *et al.,* 1995; Clarke and Roome, 1999; Purvis *et al.,* 2001).

A number of studies have put forward theoretical explanations for the relation between culture, learning and organisational innovation (Tidd and Bessant, 2011; O'Rielly, 1989; Picken and Dess, 1997; Schneider *et al.,* 1996). Different theoretical focal points provide the basics to elaborate on the significance of innovation, as being based on the culture of the organisation. This is if the innovation desires to become competitively advantageous towards the business (Barney, 1986). Researchers such as Andrew (1996), Filipczak (1997) and Schneider *et al.* (1996), discussed to some extent similar sets of cultural critical characteristics and norms. The sensitivity to cultural diversity plays an essential role in the success or failure of IT implementation (Kundi and Shah, 2007).

Consequently, for a successful system interface it is vital that the design should consider and keep in mind the cultural values (Markus, 2005). Key cultural norms that promote learning and innovation include organisational structure, freedom and risk-taking, trust, conflict and debates, communications and dialogue and participative decision-making. These cultural characteristics involved in promoting learning and implementing innovation are discussed below.

Organisational structure can play a key in facilitating learning and innovation activities by setting up the right structures to facilitate communication, transparency, sharing information and knowledge, and greater involvement to decision making and innovation (Chiva and Alegre, 2007; Tohidi and Jabbari, 2011; Ke and Wei, 2008). Innovation is increased by the use of flatter and highly participative structures and cultures (Burnside, 1990). According to Nwankpa and Roumani (2014), learning involves creating a structure that encourages new ideas and embraces innovations. This structure should be capable of driving organisational learning among their users. Ke and Wei (2008) define learning structure as the formally adopted procedural and structural arrangements, which permits organisation to collect, store, analyse, disseminate, and finally utilize the knowledge which is ERP assimilation-specific. However, if the structure is not fixable enough, top management can create ad hoc committees, special task forces and planning meetings to enable learning (Vera and

Crossan, 2004). Therefore, the dissemination of this knowledge is shaped by the structure of the organisation, either discouraging or encouraging engagement among the employees (Wang and Noe, 2010). Additionally, structure can have an effect on the knowledge dissemination dynamics, as well as individual or team learning within a company, both horizontally and vertically between the different levels of the organisation (Wiewiora *et al.,* 2013).

Freedom and risk-taking is related to the degree to which freedom is provided to employees, to define and execute their own allotted work. Freedom to perform trials and see failures, to accept mistakes made, and to discuss the dumbest of ideas, with no penalties for errors (Tidd and Bessant, 2011).

Trust, empowerment and openness are summed up by the amount of emotional security that employees experience and possess within their professional relationships. When a high level of trust exists, brand new ideas can be expected to emerge more easily. Shared and open communication encourages lateral thinking and learning (Tidd and Bessant, 2011).

Conflict and debates, pertain to the degree to which workers do not hesitate to face off regarding issues effectively, as well as to what extent are the views of the minority communicated promptly, and listened to with a receptive outlook. In addition, the clashes and contentions support more dialogue, learning, knowledge and understanding, leading to fundamentally intelligent social constructionism of brand new methodologies in a consistent way (Alvesson and Willmott, 2012).

Dialogue is characterised as a sustained investigation into the procedures, assumptions, as well as certainties that make up regular experience (Isaacs, 2000). A number of researchers (Dixon, 1997; Isaacs, 2000; Schein, 1993) regard dialogue to be imperatively vital to organisational learning. Additionally, the dispersion of an innovation relies on the qualities of the innovation, potential adopters' nature, and the procedure of communication (Tidd *et al.*, 2015). Then again, communication is alluded to as how much an organisation offers choices, desires, and objectives all through the association (Doll and Vonderembse, 1991; Carmeli and Tishler, 2004; Nahm *et al.*, 2003; Al-Mashari *et al.*, 2003). The factor of communication is seen by various experts in the region as a basic achievement factor for an ERP usage venture (Sarker and Lee, 2002; Holland *et al.*, 1999; Sumner, 1999). Rogers (1985) sees communication as a procedure in which members make and share data with each other, keeping in mind the end goal to achieve a common understanding. Leonard-Barton (1985) considers communication among potential adopters as a noteworthy force, deciding the rate at which the new product, idea or process spreads.

Finally, participative decision-making, which refers to the extent of influence that employees have in the decision-making process, as well as the empowerment of employees to make decisions (Chiva *et al.,* 2007; Cotton *et al.,* 1988; Goh, 1997). Organisations put in place participative decision-making methods, to generate benefit from the positive effects of enhanced employee involvement, satisfaction on the job and organisational commitment (Scott-Ladd and Chan, 2004; Daniels and Bailey, 1999). Participatory decision-making facilitates the results through the involvement of all employees of the organisation, resulting in commitment and satisfaction (Scott-Ladd and Chan, 2004). In addition, engaged decision-making provides better access to information, affects how the outcomes of decisions are accepted, and might enhance its effectiveness (Goh and Richards, 1997). Therefore, encouraging employees to participate in organisation's decision-making process is known as the ideal solution for the promotion and maintenance of continuous learning (Wiewiora *et al.,* 2013).

To summarise, this section discussed the importance of organisational arrangement and culture in facilitating learning and organisation's innovativeness in order to successfully implement the ERP system. Table 2.6, summarises the main cultural norms that promote learning and innovation within organisations.

Table 2.6: Key cultural norms that promotes learning and innovation.

Cultural norms	Definition	Selected sources
Organisational structure	The degree to which the structure facilitates learning and innovation activities.	Wiewiora *et al.,* 2013; Wang and Noe, 2010; Nah *et al.,* 2007; Arad *et al.*, 1997; Martins and Terblanche, 2003; Johnson and Scholes, 2005

Freedom and risk-taking	The degree to which the individuals are given latitude in defining and executing their own work. Freedom to try things and fail, acceptance of mistakes, allowing the discussion of dumb ideas, with no punishment for mistakes.	Klein and Knight; 2005; Arad *et al.,* 1997; Martins and Terblanche, 2003; Tidd and Bessant, 2011; Jamrog *et al.,* 2006; O'Reilly *et al.*, 1991; Wallach, 1983; Orlikowski *et al.*, 1995; Purvis *et al.*, 2001
Trust	The degree of emotional safety that employees experience in their working relationships. When there is a high level of trust, new ideas surface easily.	Tushman and Nadler, 1986; Tidd and Bessant, 2011; Snipes *et al.,* 2004; Klein and Knight, 2005; Gudmundson *et al.,* 2003; Dlodlo, 2011; Finger, 2005; Hart, 2010; Kalema *et al.,* 2014; Singh and Wesson, 2009; Schniederjans and Yadav, 2013; *Bock et al.,* 2005)
Conflict and debates	The degree to which employees feel free to debate issues actively, and the degree to which minority views are expressed readily and listened to with an open mind.	Tidd and Bessant, 2011; Alvesson and Willmott, 2012
Communications and dialogue	The degree of open communication and share communication that encourages lateral thinking and learning.	Templeton *et al.*, 2002; Amabile *et al.,* 1996; Pedler *et al.,* 1997; Hult and Ferrell, 1997; Isaacs, 2000; Dixon, 1997; Schein, 1993; Leonard-Barton, 1985; Nah *et al.,* 2001
Participative decision-making	The degree of influence employees have in The decision making process and empowering employees to make decisions	Wiewiora *et al.,* 2013; Goh and Richards, 1997; Pedler *et al.,* 1997; Goh, 1997; Scott-Ladd and Chan, 2004; Daniels and Bailey, 1999; Chiva *et al.,* 2007; Cotton *et al.,* 1988

Source: The researcher

2.10 Summary

This chapter has discussed the concept and definition of innovation and its key characteristics. The discussion on the concept of innovation found that the understanding of innovation has significantly changed over the last decade. While there is no unified and commonly accepted understanding of the innovation concept. Most of the definitions of innovation stress the importance of innovation and implementation. Additionally, the “innovation” phenomenon is generally associated with newness. This research will use the definition proposed by Djellal and Gallouj (2001), who view innovation as being related to the creation of new services, and new ways of managing and delivering services. This broad perspective definition of innovation can be related to ERP systems, which, as described above, entail different types of innovation. These will be discussed in the next chapter.

This chapter has also examined the process of innovation in order to identify its key stages and to explore the main factors for a successful implementation stage. This stage has been described by this chapter as 'the heart' of the process of innovation. In addition to implementation, this chapter has highlighted other key stages, which include: (i) identification of the need to innovate; (ii) developing awareness; (iii) selecting the most appropriate innovation and (iv) planning. Implementation is presented as consisting of four sub-stages: adoption, adaptation, modification and re-invention. The five attributes that influence this implementation, as suggested by Rogers (1983, 1995), are relative advantage, compatibility, complexity, trialability and observability.

Moreover, the objective of first theoretical chapter is to review the innovation literature in order to better understand and identify the key features as well as the factors that can either facilitate or impede the implementation innovation. The chapter has helped identify these motives, enablers, inhibitors and factors for the successful implementation of innovation. A greater emphasis has been placed on the role of learning as one the main factors for the implementation of innovation. The relevance of these theoretical findings to the implementation of ERP as an innovation will be examined in the next chapter.

Chapter Three: Enterprise Resource System (ERP)

3.1 Overview

This chapter will use the main theoretical findings highlighted by Chapter Two in order to investigate the key characteristics that affect the successful implementation of ERP as a complex system of innovation. This chapter offers an analytical overview of existing literature on the different views of the definitions of ERP in order to identify the most appropriate definition for the purpose of ERP as an innovation. The background of the ERP system will be discussed to shed light on its development and to understand its complexity and the factors that affect its implementation. The chapter will investigate and identify the key motives, benefits, drawbacks, limitations, stakeholders and characteristics of ERP in order to better understand the factors that influence the whole process and more particularly the stage of implementation. This chapter will review a number of theoretical and empirical works that have explored the ERP implementation stages. The literature of ERP implementation from the information technology (IT) and information system (IS) perspectives will also be reviewed. The main the main strategies and methods for the adoption and implementation of ERP as an innovation will be also examined and discussed.

This chapter places a greater emphasis on the importance of learning organisational change, and organisational culture, as main factors for the e successful implementation of ERP as an innovation.

3.2 IS Evolution in Organisations

Most organisations in all sectors of industry, commerce, non-profit and government are now fundamentally dependent on their information systems (IS) and information technology (IT). The introduction of information systems can significantly help organisations in achieving greater effectiveness and efficiency. IS promise to increase rationalisation, reduce duplication, streamline business processes, integrate disparate systems, offer a greater competitive advantage, increase innovation, and remove redundant managerial tasks through disintermediation (Loonam *et al.,* 2014; Sambamurthy and Zmud, 2000). Furthermore, Organisations around the world started to invest heavily over IT systems in the past five decades (Ezdri, 2013) and the investment continues to grow as systems have become less expensive, more integrated, and increasingly accessible with multiple functions and devices found in one system (Lin *et al.,* 2012; Harper and Utley, 2001; Quinn and Bailey, 1994). However, despite such claims, many IS implementations remain marred by poor performances and returns on investment (Loonam *et al.,* 2014; Karim *et al.,* 2007). Additionally, these systems face a permanent development lag (Neumann *et al.,* 2014) and as a result, information systems are therefore never "finished" (Zhang, 2013; Davidsen and Krogstie, 2010; Bjerknes *et al.,* 1991) in the sense of fulfilling all business requirements.

An information system has a broad range of definitions, but it can be generally explained as an umbrella term that includes the computer hardware, software design, and communication technology used to manage the business process of an organisation (Ezdri, 2013). Boell and Cecez-Kecmanovic (2015: P. 4959) claim that information systems involve ‘’ a variety of information technologies such as computers, soft-ware, databases, communication systems, the internet, mobile devices and much more, to perform specific tasks, interact with and inform various actors in different organisational or social contexts''. According to Iiavari (1991), information system is a collection of subsystems defined by either functional or organisational parameters that support decision-making and control the organisation. Alter (2008: P.451) defines an IS as ''a work system whose process and activities are devoted to processing information, that is, capturing, transmit- ting, storing, retrieving, manipulating, and displaying information". Alter's (2008) definitions of IS considers that IS are related to the particular information processing activities they perform and support. On the other hand, some researchers (Jessup and Valacich, 2008; McNurlin *et al.,* 2013; Orlikowski and Scott, 2008; Lucas, 1981) view the IS from the technology view stress the importance of IT in an organisational context. This view highlights the fact that information technology is used to capture, transmit, store, retrieve, manipulate, or display information in one or more businesses. Information system in an organisation provides processes and information that are useful to its members and clients. Researchers (Barros *et al*., 2015; Soliman and Karia; 2015; LaBrie and St Louis, 2003) emphasised that the most important computer-based information systems are: information retrieval system (IR); question-answering system; database system (DBS); management information system (MIS) and decision support system (DSS). Over the years, information system technologies have evolved from MIS, to DSS, to strategic information systems (SIS), and currently serve the purpose of combining with organisation structures to serve as competitive weapons (Alshubaily and Altameem, 2017; Harun and Hashim, 2017 Wiseman, 1985).

Loonam *et al.* (2014) claim that early IS systems were stand-alone, functional-based and transaction-oriented, while today's IS tools and functions continues to match organisational needs by becoming highly integrative, enterprise-wide, global and strategic systems. Mukherji (2002) claim that during in the 1960s, the earliest information systems were the classic centralized systems typically characterized by a mainframe host computer supported by an array of peripherals, including ``dumb'' terminals, which allowed interactive, information processing activities mostly of a transactional nature (Bryant *et al.,* 2013; Leifer, 1988). These centralized systems were modest in size in the earlier generation computers, but grew from small, medium to large centralized mainframe systems over time. The main concern among hardware manufacturers and data processing managers was achieving machine efficiency (Sprague and McNurlin, 1993). This view continues to the first 20 years of the introduction of IS systems, then it is noticeably shifted from information availability in report form to information becoming available on demand and as a base for the decision support system (DSS). This shift in in using IS has resulted from the needs to move from centralised to distributed systems, which consists of clusters of minicomputers networked through local area networks at the intra-organisational and inter-organisational levels (Mukherji, 2002).

Loonam *et al.,* 2014, in reviewing the historical journey for IS development looked at the major IS major developments. They state that during the 1980s a major concern for many top managers was the achievement of competitive advantage within their respective industries (Porter, 1980). In response to that, the IS field responded by developing systems that could provide top managers with timely information to make strategic decisions (e.g. executive support and decision support systems). While in the In the 1990s, organisations start to reflect by inwardly looking for key strategic resources that would produce their distinctive core competencies (Bryant *et al.,* 2013; Barney, 1991). In turn, the IS field reacted by building highly integrative enterprise-wide systems (Hansen and Nørup, 2017; Davenport, 1998; Schryen, 2013), which would unite every pillar of the organisation providing top managers with a single transparent view of firm's own competencies and business processes. Broadbent *et al.,* (1992) assert that in the 1990's, the process of management has become information intensive, and organisations had to make changes to their Information systems in order to meet the information requirements of managers at all levels. During the first decade of the 21st century, organisations started to extend their global operations through new and innovative business models (Kim and Mauborgne, 2005). The IS filed developed new systems that enable across-boundary organisational structures, 24/7 real-time customer-centric communication, collaborative supply chain environments, and virtual IS infrastructures delivered via cloud computing (Loonam *et al.* (2014).

Davenport et *al.* (2004) argue that Enterprise Systems (ES) are a subset of IS that integrate data and business processes throughout an entire enterprise. ES offer a set of packaged software applications that are designed around industry best practices which allow, and certainly require, clients to configure and customize the software to meet the specific needs of an organisation (Olson and Kesharwani, 2010; Orlikowski, 2007; Markus *et al.,* 2000). ES include, but are not limited to, systems such as ERP, customer relationship management (CRM), supply chain management (SCM) and business process management (BPM). According to Abbas (2011), ERP systems can be termed as large-scale information systems, as information system supports the basic concepts of what constitutes an ERP system (Hansen and Nørup, 2017). O'Brien (2004) stated, "a system is a group of interrelated components working toward the attainment of a common goal by accepting inputs and producing outputs in an organised transformation process". Moreover, O'Brien (2004) stated that "an information system uses the resources of people, hardware, software, data, and networks to perform input, processing, output, storage and control activities". ERP systems' main gaol is to integrate business functions inside the organisation and enable data flow between different units of an organisation (Abbas, 2011), Furthermore, the ERP systems as referred to as enterprise-wide software have been defined by Shanks *et al.* (2000) as those all-encompassing software solutions that integrate organisational processes through shared information and data flow. Equally, Kähkönen *et al.* (2014) and Watson and Schneider (1999) claim that the term ERP system is a generic term used for an integrated and customised computing software-based system that fulfils the majority of the information systems requirements of an enterprise. While the ERP system may not replace other IS systems such as decision support systems (DSS) manufacturing execution systems (MES), an application-level integration with these systems is necessary (Kähkönen *et al.,* 2014; Alshubaily and Altameem, 2017; Harun and Hashim, 2017). ERP systems can integrate other IS systems since the purpose of a contemporary ERP is to provide the backbone for business collaboration, external integration with business partners' systems has to be done (Kocaoglu and Acar, 2015; Chou *et al.,* 2014; Kilic *et al.,* 2014; Bahssas *et al.,*2015). In addition, ERP has the ability to reduce a firm's risk in uncertain circumstances (Tian and Sean, 2015), positively impact organisational performance by improving productivity and profitability (Nicolaou *et al.,* 2008; Nicolaou, 2004); inventory reduction (Madapusi and D'Souza, 2012) and improving organisational capabilities such as renovation (Ma and Dissel, 2008) and leanness (Powell *et al.,* 2013) capabilities.

Despite agreements on the importance of IS implementation to the success of organisations, the implementation processes of such innovations are multifaceted and require proper addressing of a wide-spread issues and challenges (Al-Debei and Al-Lozi, 2012). They also emphasised that the IS implementation challenges are perceived to be to some extent universal, still some unique features are characterising each part of the world in regards to the implementation of ICT innovations and this is mainly due to the environmental differences. IS challenges have been the research subject of a number of studies (Almalki *et al.,* 2017; Al Mahmud and Rahaman, 2015; Kornkaew, 2012; Javier and Alvarez, 2004; Berg, 2001). Al-Debei and Al-Lozi (2012) identified some common ICT implementation challenges for both developed and developing countries. These challenges include: lack of clear boundaries among different ICTs, the soft nature of ICT projects and its consequences, the rationality of ICT (s) implementation decision and other related decisions, the alignment of the ICT innovation strategy with the competitive strategy of an organisation, lack of concern of the human-resource element (needed skills, involvement and retention), lack of top-management commitment and support, ineffective management of consultants, and resistance to change and the dynamics of power (organisational politics).

Kurnia *et al.,* (2013) in identifying facilitators and challenges for IT adoption at a local Malaysian retail company categorised factors affecting the IT adoption into three groups: technology, organisation and external environment. They identified other sets of IT/IS challenges, which include difficulties in the standardisation of product information, difficulties quantifying the IT benefits, lack of skilled personnel and familiarity with IT applications, lack of clear performance measures and the limitations in finding IT skilled personnel to hire. Further, Neumann *et al.* (2014: P. 3) state that the challenge of evolutionary business information systems is ‘’ to provide a socio-technical information system infrastructure that is capable of meeting changing business requirements incrementally, where [unanticipated] changes can be incorporated incrementally [without service interruptions] directly by the stakeholders''. In addition, sustaining IT alignment with business strategies when both the business environment and technologies change ever more quickly is complex and difficult (Merali *et al.,* 2012; He and Wong, 2004; Merali, 2006). Lucey (2005) also provides another perspective of IS implementation challenges which includes: lack of management in the design phase of the IS, inappropriate emphasis of the computer system, undue focus on low-level data processing applications particularly in the accounting area, lack of management knowledge of computers, poor appreciation by information specialists of management's exact information requirements, and of organisational problems, and lack of top management support.

3.3 ERP Definition

According to Klaus *et al.* (2000) and Al-Mashari *et al.* (2003), defining ERP systems is not a simple matter. The opinions and experience of various stakeholders will vary according to their position in the organisation (Markus and Tanis, 2000). Top management may view the ERP system as having more control over data, costs and employees, while some employees may see the ERP system as a threat to their employment. Several attempts by researchers to describe ERP systems are available, but they differ slightly from one another. For example, Markus *et al.* (2000a) described ERP systems as a commercial software package that facilitates the integration of business processes and transaction-oriented data throughout the organisation. Beheshti (2006: p. 148) defines the ERP system as "a set of business applications or modules, which link various business units of an organisation such as financial, accounting, manufacturing, and human resources into a tightly integrated single system with a common platform for flow of information across the entire business". Madanhire and Mbohwa (2016) view ERP as a strategic tool which synchronizes, integrates, and streamlines data and processes of the organisation into one single system to gain a competitive edge in the uncertain business environment.

Although the above definitions seem to cover the main concepts of the ERP system, Markus *et al.* (2000b) and Beheshti (2006) do not clearly recognise the planning functionality of the system as O'Leary (2000) does. O'Leary (2000) defines ERP systems as computer-based systems developed to process an organisation's transactions to aid real-time and integrated planning and production. However, although O'Leary's (2000) definition seems to cover the main concepts of the ERP system, it does not provide a clear overview of ERP's capabilities. ERP systems help to integrate information throughout the organisation and eliminate complexity and costly links between computer systems, aiding real-time information and integrated planning and production.

The above discussion clearly defines ERP as a complex new solution with a set of IT business applications capable of linking numerous business units and functions of an organisation into a common platform in order to integrate business processes and transaction-oriented data to aid the planning and production functions and facilitate a real-time flow of information. This is echoed by Markus *et al.* (2000b), Beheshti (2006) and O'Leary (2000) who claim that ERP is a new and complex solution based on many interactions between different functions and stakeholders.

It can therefore be suggested that there are three aspects of the above ERP definitions. The first relates to the ERP system as a new and an innovative solution; the second relates to the major function of ERP, which links business units and functions of an organisation into a common platform to aid production planning and all other relevant activities, such as purchase, inventory, cost optimisation of shipping services and so forth. Third, an ERP system as an IT business application. It is also important to note that the implementation process of ERP systems is dynamic, with changing business requirements.

3.4 Brief History of ERP

A review of the historical development of ERP systems will help in understanding how these systems become an integrated complex solution. To understand the current and future applications of ERP, it is essential to understand its history, which reveals the motives linked to ERP implementation. The history of ERP can be traced back to the early 1960s, where inventory control in manufacturing organisations was the key focus. According to Wallace and Kremzar (2001), ERP evolution began with MRP (material requirement planning) systems to plan product manufacturing and the inventory of products and ordering. MRP logic applies wherever there are products being produced, regardless of whether they are jet aircraft, tin cans or food products (Wallace and Kremzar, 2001). The essential functionality of MRP is scheduling and releasing manufacturing work orders and purchase orders, which help factories to reduce the cost of inventory, as orders are provided exactly when items are needed (Schroeder, 1993). According to Sheikh (2003), MRP is still valued as the core component of the production module of ERP.

MRPII was developed to form the next step in this evolution. It is equipped with three additional elements: sales and operations planning, financial interface and simulation (Wallace and Kremzar, 2001). MRPII's essential function is to schedule and monitor the execution of production plans (Basoglu *et al.,* 2007). The aim of MRPII was to develop a new planning process that integrated all primary services (such as inventory control, production control and custom ordering) with other relevant services, such as accounting, finance and logistics (Chen, 2001; Gupta *et al.,* 2004; Shehab *et al.,* 2004). As time passed, the need to integrate all major aspects of a business grew, and so many comprehensive solutions underwent development. This led to the expansion of MRPII to cover new departments, such as finance, marketing, engineering and human resources.

The term "ERP" was used as a description for those software systems that incorporated the latest development of MRPII systems (Chen, 2001) by the Gartner group at Stanford, in the USA. ERP systems are just an extension of the MRPII systems, because they incorporate all the functional capabilities of the MRPII systems while also integrating other aspects, such as marketing, accounting and quality. ERP is often considered to be the next main development in the evolutionary series of software applications used for business operational purposes (Ptak and Schragenheim, 2003). The system was not only designed for manufacturing companies; it can also be utilised by any business that desires the integration of all their functional areas (Abdinnour-Helm *et al.,* 2003).

As discussed above, although the ERP system was built using MRP and MRPII, it is a more advanced version of its predecessors. MRP was adopted mainly in the manufacturing industry to plan for production, including inventory planning and ordering. ERPII was designed to aid the production scheduling and to monitor production plans. The basic features of ERP systems are almost the same as those of MRPII. (Ptak, 2000; Gable *et al.,* 1998). One difference concerns ERP being more of an enterprise software that presents business processes in a broader scope, and consequently leads to increased effectiveness in terms of managing different business areas. The financial integration is stronger, and the supply chain capabilities, which are used for supporting businesses beyond the organisation, are based on robustness.

To summarise, this historical development shows that ERP has helped businesses to integrate and coordinate key functions and activities more effectively, in order to enhance performance. Furthermore, it shows how these systems became an integrated complex solution. ERP development is based on the ongoing demand from organisations for different reasons and motives.

3.5 ERP Benefits

Understanding the potential benefits that ERP systems can deliver helps in understanding its key drivers. It is important to distinguish between the reasons why organisations implement ERP, which reflect the organisations' expectations from the implementation of ERP. These expectations and key drivers are different from one organisation to another, depending on the level, the degree and the success of the implementation. A number of ERP benefit models and frameworks have been published (Sadrzadehrafiei *et al*., 2013; Sari *et al.*, 2012; Annamalai and Ramayah, 2011; Chou and Chang, 2008, Shang and Seddon, 2002; Gattiker and Goodhue, 2000; Esteves *et al.,* 2001; Stefanou, 2001; Markus and Tannis, 2000; Murphy and Simon, 2002). The most cited framework is Shang and Seddon's (2002) framework, which provides a summary of the advantages obtained from all enterprise and ERP systems. The benefits of ERP systems can be categorised into five distinct dimensions:

operational, managerial, strategic, IT and organisational. These benefits dimensions are listed in details in Appendix 1 summarises the commonly cited ERP benefits based on the Shang and Seddon (2002) framework.

The first dimension of ERP implementation benefits is the operational dimension, where an ERP system can be employed to automate business processes and allow process changes. The system is expected to create value through reducing cost and cycle time, and enhancing productivity, quality and customer service. Moreover, ERP reduces IS maintenance costs and increases the ability to deploy new IS functionality (Ross, 1998). ERP also helps to combine the business processes and IT of an organisation to ease the flow of information through business functions (Gattiker and Goodhue, 2000).

ERP system can automate business processes and enable process changes (Shang and Seddon, 2002; Al-Mashari, 2003). It is expected to provide the benefits in terms of cost reduction, cycle time reduction, productivity improvement (Sadrzadehrafiei *et al*., 2013; Shang and Seddon, 2002; Bergstrom *et al.,* 2005; Hasan *et al.*, 2011), quality improvement and customer service improvement. ERP can make substantial reduction in inventory and production cost (Annamalai and Ramayah, 2011; Ragowski and Somers, 2002; Hasan *et al.*, 2011; Umble *et al.* 2003; Shang and Seddon (2002); Hawking *et al.* (2004).

The managerial dimension, where improved resource management can be obtained, enhances decision making, as well as improve planning and performance in various operating departments (Shang and Seddon, 2002). Administrative costs are reduced as a result of information sharing, since ERP eliminates some or all manual activities involved with keying information from one system to another (Gattiker and Goodhue, 2000).

The strategic dimension is where an ERP system can aid an organisation by supporting and facilitating business growth and alliance, making business innovations, establishing external linkages and cost leadership, and creating product differentiation (Shang and Seddon, 2002). ERP is instrumental in helping organisations adopting more accepted best practice business processes (Cooke and

Peterson, 1998). Regarding IT infrastructure, an ERP system offers business flexibility to facilitate current and upcoming changes, the capacity enhancement of and IT cost reduction.

Finally, the organisational dimension is related to an ERP system enhancing working patterns, altering work patterns, aiding organisational learning, building a joint vision and empowering workers (Shang and Seddon, 2002). Davenport (1998) stated that process standardisation and integration across organisational units enables and enhances the centralisation of administrative activities, such as accounts payable and payroll, which may result in some considerable administrative savings. Moreover, ERP organisational relative advantage benefits include the integration of previously scattered functional information systems in a single architecture, the centralisation of organisational activities, the organisation-wide access to a single shared database, the involvement of widely spread branches of multinational firms, as well as the inclusion of customers and/or suppliers in the value chain and conceptualisation (Hong and Kim, 2002; Al-Mashari, 2003; Poston and Grabski, 2001; Rajagopal, 2003).

However, there is a growing body of literature that provides a critical view of ERP and the benefits that it is supposed to deliver. For instance, Salimi (2005) claims that the ERP benefits discussed by most researchers tend to be either snapshots taken at a single timeframe in the life of an ERP system, or a very high-altitude depiction of ERP benefits. This view is also supported by Velcu (2007), who posits that the claimed benefits are not linked to the reason for which ERP is implemented in the first place, while Markus and Tanis (2000) argue that the advantages of ERP systems need to be assessed with regards to the organisation's individual objectives, for the system. Markus and Tanis (2000) suggest that no single amount of ERP success is enough for all the apprehensions the executives of organisations might have regarding the enterprise system experience. Additionally, different measures are needed at different stages in the life-cycle of the system. Furthermore, ERP is considered to be the most strategic planning platform (Sweat, 1998), since it supports business growth and business alliance, and aids in building business innovations (Shang and Seddon, 2002). However, Scott and Kaindall (2000) claim that most organisations reported that at least 20% of their required system functionality is missing for the ERP system they selected. Therefore, while organisations may choose to implement ERP for one or more reasons, it is highly possible that such implementation may yield more benefits than they hoped for, or in some cases fewer benefits than they hoped for. Davenport (2000) suggests that there are various sorts of benefits, and that a few of them are likely to be noted before others. For example, benefits from enhanced transactional processes as well as common data seem to precede the benefits associated with enhancements in management and decision-making.

Similar to innovation, gaining benefits from the ERP implementation varies from one organisation to another. An ERP system can provide substantial benefits in different levels and dimensions (e.g. operational, managerial, IT infrastructure, strategic and organisational) to the implementing organisation, yet organisations may vary on the degree to which they acquire these benefits. These underlying benefits which can improve the organisation's competitive positioning, for instance, can be associated with decreased manufacturing costs, and increased flexibility and speed (Spathis and Constantinides, 2003). However, some organisations may not be able to gain all these benefits, as that depends heavily on a number of factors that could either enable or hinder the implementation experience. The complexity of the ERP system itself and the implementation process may prevent organisations from gaining some of their intended and expected benefits of implementing ERP systems. As a result, organisations may fail to successfully and effectively implement ERP systems.

3.6 ERP Implementation Drawbacks and Limitations

This section will investigate the drawbacks associated with ERP in order to gain a better understanding of the main factors for the successful implementation of ERP. Despite its expected benefits, ERP also presents a number of drawbacks. In fact, it is not as easy to gain benefits from an ERP as people promoting these systems proclaim (Azevedo *et al.*, 2012; Boersma and Kingma, 2005). Hong and Kim (2002) claim that the success of ERP implementation depends on the level of deviation from the goals of the project in terms of time, cost, benefits and system performance. Rosemann and Wiese (1999) were also of the opinion that an ERP system is considered successful if it is configured appropriately, is running, and the entire project is on time and within the set budget, with only slight deviation. Markus and Tanis (2000) described a series of ERP success metrics, consisting of the early operational metrics, project metrics and business results in the long term, as the majority of the criteria for success emphasise the costs and advantages, as well as the degree of deviation from the project objectives. Implementation effectiveness is, therefore, believed to be the most suitable measure for success and also a foreteller of success.

ERP implementation has its own series of issues, one of which is the disparity between the organisation's goals and the benefits attained from the system. Robey *et al.* (2002) suggested that the ERP package configuration could cause difficulties, since it is the software that mostly determines the method of handling processes in the business. This could result in failure and costly drawbacks (Wu and Wang, 2006; Peci and Vazan, 2014; Dezdar and Sulaiman, 2009; Davenport, 1998). Markus and Tanis (2000) outlined the key reasons for implementation failure in organisations, including risk of losing competitive advantage, resistance to change, and high costs. As indicated by Iacovoc and Dexter (2005), around 15% of technological innovation adoptions are cancelled prior to completion, with devastating impacts on some organisations. According to Sawang and Matthews (2010), innovation cancellation could be attributed to either management failure, technology failure, learning from market testing, or environment uncertainty.

A significant number of ERP implementation attempts ended in failure (Umble *et al.,* 2003). As estimated by Poba-Nzaou *et al.* (2008), the rate of failure of ERP implementation is in the range of 66–70% in developed countries (Sar and Garg, 2012). In most cases, ERP is considered as a substantial investment for an organisation. For example, the installation of SAP for some organisations amounts to about $30 million in licencing fees, and for professional services the cost is more than $200 million (Ekanayaka *et al.*, 2002). Shehab *et al.* (2004) pointed out that although organisations spend millions of pounds on ERP systems and its implementation, there is clear evidence supporting the fact that organisations continue to encounter various difficulties during the actual implementation. Wong *et al.* (2005) and Monk and Wagner (2006) also supported this view through various studies, and reported that organisations have lost a major portion of their business as a result of ERP implementation failure. Moreover, the failure of ERP implementation is not just restricted to smaller organisations – large organisations also experience massive losses. Dow Chemical and FoxMeyer Drug both experienced a loss of $500 million, Dell Computers faced a loss of $115 million, while Nestlé struggled with an ERP project worth $280 million, as did others such as Apple Computer, Allied Waste and Boeing (Bingi *et al.,* 1999).

In developing countries, the rate of failure would presumably be higher due to major issues associated with the economy, culture, fundamental infrastructure and lack of technology awareness. This could further raise the bar of the ERP implementation failure rate in comparison to developed countries (Lewis, 2001). Due to a series of factors (e.g. exceeding the projected cost, the complexity of ERP, management and project failure), some ERP projects either failed or were abandoned. Organisations not gaining all the benefits for which they had hoped could also be viewed as failure (Umble *et al.*, 2003). According to Poba-Nzaou *et al.* (2008), around 66% of ERP projects in developed countries failed. This failure rate could even be higher in e developing countries, since they may face more and different problems that those experienced by developed countries. Culture and lack of experience and expertise can, for instance, contribute to unsuccessful attempts to implement ERP systems. ERP failure can affect all types of business (i.e. small, large, governmental and non-governmental). Table 3.1 summarises the key limitations and drawbacks of ERP systems.

Table 3.1: Key ERP systems limitations and drawbacks

Limitations and Drawbacks	Comments/Selected sources
Configuration: ERP package configuration can cause difficulties	Robey *et al.,* 2002
Cost: ERP is considered a substantial investment for an organisation	Kamhawi, 2008; Markus and Tanis, 2000
Gaols and benefits disparity: disparity between the organisation's goals and the benefits attained from the system	Dezdar and Sulaiman, 2009
Risk of losing competitive advantage, resistance	Kamhawi, 2008; Markus and Tanis, 2000
Time consuming for any organisation	Davenport, 1998

The complexity of ERP systems: Numerous features, modules and users, which need to be considered carefully when implementing the system	Kamhawi, 2008; Volkoff, 1999; Poston and Grabski, 2001; Hossain *et al.,* 2002
ERP integration: Difficulties in integrating the ERP software with the hardware, operating systems, database management systems and telecommunications	Ghosh, 2012; Markus and Tanis, 2000
Economy, culture and fundamental infrastructure and lack of technology awareness. In developing countries, ERP implementation failure rate could be further increased in comparison to developed countries	Kamhawi, 2008; Lewis, 2001

Source: The researcher

To summarise, the discussion above highlights the main limitations and drawbacks, suggesting that, similarly to innovation, there are factors that need to be taken into consideration and addressed by organisations, in order to ensure that ERP is effectively implemented so that it can deliver the expected solutions and benefits. ERP requires a huge investment that could potentially alter the whole organisation; it is a challenging project for all organisations. This presents more challenges to the implementation experience, which organisations must consider carefully.

3.7 ERP Characteristics

This section will discuss the ERP characteristics in order to gain a better understanding of system and how it can be successfully implemented. Although ERP is mainly a computer software, it has its own characteristics that need to be well understood and taken into consideration in order to ensure what is needed for its successful implementation. To distinguish ERP systems from any other IT-related systems, O'Leary (2000: p. 27) suggests the following characteristics of a good ERP system.

1) Readiness for use with the internet and intranet;
2) ERP is a packaged, bundled application developed for a conventional and web-based client server environment;
3) ERP systems are comprehensive where it can integrate almost all business processes and can be used for processing most transactions (Barki and Pinsonneault (2002);

4) It uses a common database; an ERP is a database that is suitable for use across the entire organisation, storing complete data and information at every instant of time. Providing real-time data is an important characteristic of a good system, and
5) ERP should be able to integrate all activities and transactions related to planning and processing (Barki and Pinsonneault (2002).

On the other hand Zeng *et al.*, (2003), added that an effective ERP system should be:

1) Flexible;
2) Be able to respond to and be of use when the needs of an organisation change in the future;
3) Modular and open: an ERP system cannot let any module become disconnected if other modules are going to be interrupted (Barki and Pinsonneault (2002); and
4) linked to external entities; the boundaries of an organisation should not limit the ERP system; it should still link the firm with external entities.

Different ERP systems are similar, but can also be differentiated by a number of aspects. This is because ERP developers and software vendors make various assumptions about business practices, and it is not necessarily the case that they will be valid for every organisation (Umble *et al.,* 2003). Consequently, purchasing such a system has implications beyond simply buying a software package; it implies that the developer's view of ideal practices for various business processes is also being bought (Umble *et al.,* 2003). Furthermore, the ERP system is a software package containing different modules (e.g. financial management, accounting, manufacturing, production, sales and distribution) (Al-Mashari *et al.,* 2003). Each module deals with a key part of business aspects; for example, the human resources module integrates human resource management in order to direct personnel-related duties between employees and managers, whereas the sales module comprises pricing, order management, sales planning and sales management (Umble *et al.* 2003). This in turn is a major challenge that could affect the whole ERP system. The many specific functions of each module are linked to the database and other modules via the ERP system (Sheu *et al.,* 2004). In addition, in an ERP system, a module's names and numbers may differ with regard to different vendors. Most ERP software packages are flexible enough to allow organisations to choose some modules without being forced to purchase the entire package.

Before an enterprise system can be fully understood, and the risks associated with it comprehended, there is a need to grasp the problem for which the system is used as a solution (Davenport, 1998). At its most basic level, an ERP system can be regarded as a single comprehensive and huge database. Information from every source is fed into this database, which then passes onto other modular applications, so that all business tasks can be provided with an adequate level of support. This is true for all tasks that are carried across different business units and across the globe. Obviously, the management and maintenance of an extensive base of computer systems leads to increased costs that arise because data has to be stored. Data redundancy must be dealt with, and data may also need a modification or reformation before it becomes acceptable for use by another system; this leads to additional costs as well. Other matters also lead to a rise in expenses, such as updating and debugging obsolete software codes and initiating a means of communication between the systems, so that data transfer can be automated (Davenport, 1998).

To summarise, this section discussed the ERP main characteristics in order to gain a better understanding of system and how it can be successfully implemented. ERP is mainly a computer software, it has its own characteristics that need to be well understood and taken into consideration in order to ensure what is needed for its successful implementation. Similar to innovation, ERP is found to be comprehensive, using a common database, integrating all activities and transactions, flexible, modular and open. It also has the ability to be linked to external entities.

3.8 ERP as a Complex Innovation

This section will discuss the ERP as a complex system of innovation to shed a light on its complexity that need to be well understood and taken into consideration in order to be successfully implemented. An ERP system is often presented as a complex system (Abugabah *et al.*, 2015; Rajnoha *et al.*,2014; O'Leary, 2000; Bingi *et al*, 1999; Volkoff, 1999; Poston and Grabski, 2001). ERP system can be considered as an innovation if it creates values by delivering the expected benefits. According to Tainter (1988), a complex system of innovation is inhibited by the same evolutionary factors that regulate all complex systems. Mason (2007: p. 10) defined complexity as "the measure of heterogeneity or diversity in internal and environmental factors such as departments, customers, suppliers, socio-politics and technology". According to Sherif (2006: p. 73), complexity theory is "concerned with the study of emergent order in what otherwise may be considered as very disorderly systems". From the point of view of Rogers (1983), complexity is the degree to which some innovations are difficult to understand and use. This complexity of ERP systems stems from the increasing numbers of modules for each functional area of the business processes; system integration (Fontana, 2009; Yusuf *et al.,* 2004), in addition, added to this complexity. Increasing ERP systems stockholders benefits and involvement is another factor that increases the level of complications when implementing the system. There are additional difficulties which can arise when in integrating the ERP software with the hardware, operating systems, database management systems and telecommunications (Markus and Tanis, 2000). Additionally, cross-module and data integration and process standardisation add to the complexity of these systems which often require the existence of a good level of absorptive capacity (Kwahk and Lee, 2008). Rogers (1983) suggests that the perceived complexity of any innovation, with the absence of appropriate skills and knowledge, could lead to change resistance and failure to reap the benefits from ERP implementation. Furthermore, ERP implementation requires considerable changes that must be carefully managed in order to acquire the benefits of an ERP system.

In addition, ERP implementation needs substantial efforts towards project planning. Nah (2003) states that perhaps the biggest problems that ERP project leaders come across, are not related to the implementation itself, but from expectations of senior staff, board members and other key stakeholders. Therefore, it is necessary to set the project goals before even looking for top-management support. Several ERP implementations have seen failure as a result of the absence of clear plans and a well-defined scope (Somers and Nelson 2004). Therefore, the capability of maintaining ERP implementation scope, closely pertains to planning. Therefore, it is possible for organisations to achieve (Gargeya and Brady, 2005). This; however, indicates that the management of implementation scope needs to be planned carefully planned before commencing of the project. The scope must also be defined clearly, and be limited. It should be part of absorptive capacity which can help businesses to be well equipped for the effective implementation of ERP. A focus on results is also important, as well as constant tracking of budgets and schedulers against targets (Rosario, 2000; Wee, 2000; Holland *et al.*, 1999). Consequently, the complexities associated with the project can be reduced, making it easier to follow the project time plan (Sherrard, 1998).

Similarly to innovation, the complexity of an ERP system stems from interaction between many factors and actors (i.e. systems, subsystems, stakeholders, implementation scope and various modules and functions). This, as mentioned above, presents many challenges that limit the chances of implementation being successful in practice ((Rogers, 1983). ERP implementation requires considerable changes that must be carefully managed in order to acquire the benefits of an ERP system. Moreover, the complexity of these systems often require the existence of a good level of absorptive capacity (Kwahk and Lee, 2008).

3.9 ERP Innovation Type

The objective of this section is to investigate which of type of innovation is ERP in order to better understand the factors, in terms of capabilities, resources, management and organisation, for its implementation. This investigation is based on the innovation typology presented and discussed in chapter two.

First: ERP is a radical innovation. According to Tainter (1988) and Chaveesuk (2010), a complex system innovation such as ERP can be inhibited by the same evolutionary factors that regulate all complex systems. Many scholars echo this view For instance, Kraemmerand *et al.* (2003) and Boudreau and Robey (1999) describe ERP system as a radical logistical innovation. For O'Leary (2000) and Bingi, Sharma and Godla (1999) ERP is a complex process that can be inhibited by the same evolutionary factors that regulate all complex systems (Tainter, 1988). For Joseph and Diane (2006) ERP is a business information integration systems by nature which generates extensive organisational, managerial and operational changes (Spathis and Ananiadis, 2005; Wu and Wang, 2006). Furthermore, ERP can thus also be considered a fundamental innovation within the organisation as well as in the technology it employs. That is because it demands comprehensive implementation of radically new processes in the organisation's business practices and new technology (Bourdeau and Robey, 1999). Its employment is bound to bring new work pathways, jobs, inter-departmental communication, procedures, and structures (Kallinikos, 2004).

Second: ERP can also be an incremental innovation. ERP is considered as on ongoing development of procedures and an enhancement to the existing information systems in place (Motwani *et al.*, 2002; Hong and Kim, 2002); therefore, ERP could bring small technological improvements as opposed to radical technologies depending on what organisations have been using in terms of enterprise systems. Therefore, the degree of novelty depends on the level of change, which can be either minor improvement to the existing products or radical changes, which revolutionize the whole way we think about and use them (Tidd and Bessant, 2009). Therefore, it should be noted that such a major change needs to be implemented as a streamlined process with multiple stages, which would take considerable periods of time and significant resources. Therefore, the outcomes of implementing ERP in a business organisation may heavily depend on the rift between the old and new systems' capacities as well as on the available resources and time.

Third, ERP is an organisational innovation. ERP is also found to be an organisational innovation since it brings changes to management practice, production approaches and external relation (Nandi and Kumar, 2016; Maas *et al.,* 2016; Spathis and Ananiadis, 2005; Wu and Wang, 2006). ERP is considered to be a strategic planning platform (Sweat, 1998), since it supports business growth and business alliance, and aids in building business innovations (Shang and Seddon, 2002). ERP helps organisation by providing flexibility, integration and synergy building (Sari *et al.,* 2012; Al-Mashari, 2003; Shang, 2002; Gattiker and Goodhue, 2000; Nicolaou, 2004), promoting and improving cooperation, knowledge and expertise and improving performance (Sari *et al.,* 2012; Shang and Seddon, 2002; Nicolaou and Bajor, 2004); enhancing reporting function (Shang and Seddon, 2002; Spathis and Constantinides, 2003); facilitating and improving organisational learning (Sari *et al.,* 2012; Shang and Seddon, 2002); providing and generating centralised information (Beheshti, 2006; Spathis and Constantinides, 2003); integrating companies globally (Bingi *et al.*, 1999; Wah, 2000), helping companies to achieve competitive advantage (Bingi *et al.*, 1999); and providing better resource management (Shang and Seddon, 2002).

Fourth, ERP is a technical Innovation. Slooten and Yap (1999) assert ERP happens to be the first initiative that fundamentally connects IT with business strategy and management, letting each affect the other. Furthermore, this kind of an integrated system will integrate the whole process of information flow within the organisation's networks (Davenport, 1998). This kind of integration of information and data leads to elimination of redundant and unwanted processes as well as eradication of issues in cross-functional coordination. This, in turn, leads to a unified view that the organisation's managers can experience with regard to its processes and practices (Parr and Shanks, 2000). Therefore, ERP is considered as a technical innovation which brings benefits such as IT system standardisation (Sari *et al.,* 2012; Beheshti, 2006), technology upgrade (Shang and Seddon, 2002), integration of applications (Shang and Seddon, 2002), IT cost reduction (Sari *et al.,* 2012; Shang and Seddon, 2002; Ross, 1998), minimum redundancy of data and operations (Hossain *et al.*, 2002; Amoako-Gyampah, 2007), IT infrastructure capacity improvement (Shang and Seddon, 2002), unified data sources (Sari *et al.,* 2012; Yen *et al.*, 2002; Umble *et al.*, 2003), deployment of new IS functionality (Ross, 1998), ease of the flow of information through business functions (Gattiker and Goodhue, 2000), and enhancement of working patterns and empowerment of workers (Shang and Seddon, 2002).

Fifth, ERP can also be viewed as an administrative innovation which involves major changes to the existing administrative structure, procedures and process; consequently. ERP is considered as a managerial tool, which helps managing an organisation in an integrated manner (Nicolaou, 2004). According to Nicolaou and

Bajor (2004), ERP promotes cooperation, knowledge and expertise, authority and responsibility and can thus positively influence the management of organisations. ERP also improves communication (Sari *et al.,* 2012; *Jansen et al*. 2006; Jaskyte, 2011; Kansal, 2007; Žabjek *et al.* 2009; Gibson *et al.*, 1999; Yen *et al.*, 2002), enhances the centralisation of administrative activities (Davenport, 1998), improves working patterns (Shang and Seddon, 2002), empowers workers (Shang and Seddon, 2002), builds common vision (Shang and Seddon, 2002), increases interaction (Hasan *et al.*, 2011) and connects stakeholders' interests (Umble *et al.*, 2003; Yen *et al.*, 2002; O'Leary, 2000).

Sixth, ERP is a process innovation. ERP systems are regarded as the foundation of business intelligence, since they provide managers with an integrated and combined view of all business processes (Parr and Shanks, 2000; Nash, 2000). Several managerial and control processes are embedded in an ERP system beforehand (Pereira, 1999). As an example, the most popular ERP system is the SAP R/3, which is sold to clients based on the fact that it would offer the most perfect solutions in the industry for all business processes (Bancroft *et al.*, 1997). Furthermore, ERP helps in combining and connecting business processes and (IT) of an organisation to ease the flow of information through business functions (Gattiker and Goodhue, 2000; Klaus *et al.*, 2000), improves business process and maintains 'best practices' (Sari *et al.,* 2012; Shang and Seddon ,2002; Al-Mashari, 2003; Parr and Shanks 2000; Nash, 2000; Gattiker and Goodhue, 2000). For Boudreau and Robey (1999), ERP can be seen as a process innovation since it requires the simultaneous implementation of new technology, new business processes, organisational structures and individual changes.

The above discussion clearly shows that a successful implementation of ERP system can bring about benefits and changes at different levels of the business which support the view that ERP can be seen as an innovation which can either be radical and/or incremental as well an organisational, technical, administrative and/or, process. Each type of ERP as an innovation would require certain set of capabilities and resources in order to achieve the best intended goals of its implementation.

3.10 Main Stages of the ERP Process

The objective of this section is to examine the importance of the ERP implementation and to identify its main stages. As mentioned in the previous chapter, it is essential for organisations to comprehend and plan every stage of the implementation process carefully. A number of theoretical and empirical works highlighted the importance of the ERP implementation stages (Nandi and Kumar, 2016; Shanks *et al.,* 2000; Motwani *et al.,* 2002; Umble *et al.,* 2003; Mabert *et al.,* 2003; Cooper and Zumd, 1990; Zhang *et al.,* 2003; Al-Mashari and Zairi, 2000; Markus *et al.,* 2000a; Al-Mudimigh *et al.,* 2001; Kwon and Zmud, 1987; Delone and McLean, 1992; Parr and Shank, 2000; Somers *et al.,* 2000; Saunders and Jones, 1992; Myers *et al.,* 1997; Schniederjans and Yadav, 2013; Kotter, 2007; Klien and Sorra, 1996). Most of the studies have been exploring the implementation of ERP from an information system perspective (IS). This research, which is essentially focused on the innovation perspective, is also based on the more general IS implementation research pursuing the process view (Markus and Robey, 1988; Newman and Robey, 1992).This optimistic view of the ERP implementation process comes out of an old idea representing an IS gamut of research (Newman and Robey, 1992). This idea is built on the perspective that IS can only be implemented as a process with multiple stages (Markus and Robey, 1988). Scholars in this school of thought went on to try and build a model that could explain the complete process of ERP application (Kwan and Zmud, 1987; Delone and McLean, 1992; Saunders and Jones, 1992; Klien and Sorra, 1996; Kotter, 2007; Myers *et al.*, 1997; Markus and Tanis, 2000; Parr and Shanks, 2000; Ross and Vitale, 2000; Somers *et al.*, 2000; Chang *et al.*, 2008; Schneiderjans and Yadav, 2013). The studies are not in agreement with regard to the number of stages included in the process, beginning with the shortest model with three (Parr and Shanks, 2000), while some other say it is four (Markus and Tanis, 2000), five, in others' opinion (Ross and Vitale ,2000), and lastly, six, in the opinion of some (Kwon and Zmud, 1987).

A six-stage model of Information Systems (IS) implementation was developed by Kwon and Zmud (1987), which was then refined by Cooper and Zmud (1990) and it was subsequently adapted by Somers and Nelson (2004). It consists of six stages: initiation, adoption, adaptation, acceptance, routinisation and infusion. This model is based on organisational change, innovation, and technological diffusion literature. The purpose of the model is to offer a directing and organizing framework for ICT implementation research. In addition, it also identifies five contextual factors that impact on processes and products in each implementation stage. These factors are the characteristics of the involved community's characteristics, the organisation itself, the technology involved, the process, and the environment of the organisation. Such a model would fit within the list of models discussed in the second chapter (Leonard-Barton, 1985; Tidd and Bessant, 2011).

In contrast, the model of the ERP lifecycle by Esteves and Pastor (1999) displays a complete lifecycle model. This model comprises also six stages. These stages are: adoption decision stage, acquisition, implementation, use and maintenance, evolution and finally retirement. Esteves and Pastor's model can also be considered as similar to most innovation models (Saad, 2000; Tidd and Bessant, 2011; Leonard-Barton, 1985) in which the implementation stage comprises sub stages aimed at taking into consideration the dynamic environment and hence the need for the innovation to be adapted, modified and upgraded. As discussed in the previous chapter, Saad (2000) identified the five main stages of the innovation process, which are identification of the need to innovate, developing awareness, selecting the innovation, planning and implementation. The latter stage (implementation), in which objective the innovation is expected to take place, consists of four sub-stages: adoption, adaptation, modification and re-invention. The objectives of these sub stages is to ensure that the new idea is modified and adapted to better fit the environment in which it is to be used and to sustain the innovation. Therefore, the ERP implementation process follows the same concept as the innovation implementation stages. This starts with the identification of the need to innovate the current practice/process, developing awareness of the new idea with the view of minimising the inhibitors of ERP implementation while ensuring success, evaluating and selecting the ERP system by performing a situational evaluation and a comparison of innovative alternatives by exploring their strengths and weaknesses (Saad, 2000), planning and anticipating the events that are likely to occur, and ensuring the best fit between the ERP system and the context in which it is going to operate, before, finally, the implementation the ERP system. In this stage, four sub-stages need to be considered when adopting the ERP system: adoption, adaptation, which concerns dynamic changes through continuous alignment between innovation and its environment, modification, which concerns the ability to alter innovation through training and learning; and finally, re-invention, which refers to "alteration of the original innovation to suit users' needs and ensure sustainability" (Saad, 2000).

To summarise, this section has examined and discussed the importance of the ERP implementation process and has identified the main stages of the successful implementation of ERP as an innovation. After reviewing the most used ERP process models, this study adopts Saad’s (2000) module of innovation process (discussed in details in chapter two), since it provides a comprehensive view of the innovation process.

3.11 Key Factors for the Successful Implementation of ERP

This section aims at investigating and identifying the key factors for the successful implementation of ERP as a complex system of innovation. These factors include the main motives for ERP implementation, key stakeholders, ERP implementation strategies and methods, the importance of learning and the need for an organisational culture that support the development and implementation of ERP systems. These factors believed to be of most importance in supporting learning and knowledge sharing with regards to ERP implementation. Saad (2000) claims that success of innovation relies on the ability of an organisation to execute a creative combination or integration of two or more success or enabler factors. These main factors will be discussed in the following sections.

3.11.1 Main Motives for ERP Adoption

Organisations implement the ERP systems for different motives. According to Kharuddin *et al.* (2015: p. 659), ‘’an understanding of the motives for ERP adoption is important because the rationale used to justify the ERP adoption decision may contribute to the subsequent success or failure of the ERP system implemented''. Similarly to most innovations, the prime reason for adopting an ERP system is principally related to the challenges arising as a result of fierce competition, globalisation, changes in technologies and products and rapid changes in business needs (Davenport, 2000).

Within the IS literature, operational or strategic objectives are understood to be the cause of the organisation's overall motivation into launching a new project (Smith *et al.*, 2008). Additionally, such technical requirements within the organisation that ultimately would lead to such an upgrade as the said project would bring about are also considered to be part of the term *organisational motivation* (Rahim *et al.*, 2011). Some scholars believe there are two such sources of organisational motivation that inspire new ERP projects: business and technical (Ross and Vitale, 1998; Mabert *et al.*, 2000; Markus and Tanis, 2000; Botta-Genoulaz and Millet, 2005; Chand *et al.*, 2005; Velcu, 2007). While business motivation here implies the organisation's intent to secure competitive advantage through increased customer orientation and improved efficiency of the systems within the organisation (Tomblin, 2010). Technical motivation here refers to the organisation's intent to make use of the system's technical capacities (Themistocleous *et al.*, 2001). At the same time, Ross and Vitale (1998) posited that ERP projects are inspired as an effect of the following six organisational motivations: need of a unified platform, improvement in processes, visibility of data, reduction of operating costs, improvement in customers' responsiveness, and better strategic decision making.

Organisations have been faced with a few challenges, including those related to growing markets and more competition, mergers, acquisitions, customers' increased expectations, and process restructuring. These challenges, and the arising opportunities, have led business firms to revise costs throughout their supply chains, give significance to fast turnaround times, more focused inventories, increased variety of products, focus on customer support, smartly manoeuvre international supply and demand, and focus on improved production (Shankarnarayanan, 2000; Umble, 2003). However, the gap that grew between regulatory capabilities and IT development and the resulting frustration, the Y2K bug rumours, organisations' technical incapacity to lead seamless systems integration (Holland and Light, 1999), and amalgamation of European currencies (Chung and Snyder, 2000) also led to higher demand for ERP adoption in the business world. Table 3.2 provides a summary of the most common motives for ERP implementation.

Table 3.2: Key motives for ERP implementation.

Key motives	Selected sources
Replace legacy systems	Kamhawi, 2008; Mabert *et al.*, 2003; Holland and Light, 1999; Markus and Tanis, 2000
Solve the Y2K problem	Mabert *et al.*, 2003; Chung and Snyder, 2000; Markus and Tanis, 2000
Ease of upgrading systems	Mabert *et al.*, 2003; Markus and Tanis, 2000; Mabert *et al.*, 2000; Chand *et al.*, 2005; Botta-Genoulaz and Millet, 2005
Simplify and standardize systems	Kamhawi, 2008; Mabert *et al.*, 2003;Davenport, 2000; Ross and Vitale, 1998; Markus and Tanis, 2000
Pressure to keep up with competitors	Kamhawi, 2008; Mabert *et al.*, 2003; Davenport, 2000; Markus and Tanis, 2000
Improve interactions and communication with suppliers and customers	Mabert *et al.*, 2003; Umble *et al.* 2003; Ross and Vitale, 1998
Restructure organisation	Mabert *et al.*, 2003; Markus and Tanis, 2000; Mabert *et al.*, 2000; Chand *et al.*, 2005; Botta-Genoulaz and Millet, 2005
Gain strategic advantage	Kamhawi, 2008; Mabert *et al.*, 2003, Davenport, 2000; Ross and Vitale, 1998
Link to global activities	Mabert *et al.*, 2003; Davenport, 2000; Markus and Tanis, 2000
To meet to fierce competition	Markus and Tanis, 2000
Reduce cost	Kamhawi, 2008; Umble *et al.* 2003; Ross and Vitale, 1998
To manage supply chain activities	Umble *et al.* 2003
Improve quality	Umble *et al.* 2003; Mabert *et al.*, 2000; Chand *et al.*, 2005; Botta-Genoulaz and Millet, 2005
Process improvement	Kamhawi, 2008; Ross and Vitale, 1998; Mabert *et al.*, 2000; Chand *et al.*, 2005; Botta-Genoulaz and Millet, 2005

Source: The researcher

Velcu (2007) also argues that organisations may experience ERP implementation differently based on their own ERP implementation motivations. Additionally, he asserts that despite the similar ERP implementation motivations shared by organisations across the world, the implementation experience and business performance of ERP systems are different among countries, industries, sectors, business types and system types. For instance in the context of the Saudi context and in line with the motives highlighted in Table 3.1. Abukhader's (2015) study shows that the implementation of ERP in Saudi Arabia's private hospitals are, essentially motivated by the need to simplify and standardise systems, gain strategic advantage, improve interactions and communications with suppliers and customers, replace legacy systems, ease of upgrading systems, gain seamless integration among several information systems being used, link to global activities, pressure to keep up with competitors, solve the Y2 K problem and to restructure organisations.

ERP implementation motives show how and why ERP has emerged and evolved historically. It shows how the motives are more complex and integrated. This clearly suggest the need for an appropriate level of knowledge base (or absorptive capacity) which can help the business select and acquire as well as assimilate, and adapt the ERP system in order to better use it and reap the expected benefits. .

Similarly to any complex system of innovation, the successful implementation and use of ERP would also need an appropriate organisational structure and culture which will be discussed in the following sections.

3.11.2 ERP Key Stakeholders

Identifying and reviewing the roles of stakeholders in the implementation of ERP is crucial. This is why Seddon *et al.* (1999) argue that it is not worth talking about the benefits of IT systems without identifying the stakeholder groups for which their interest and benefits are judged. The importance of the stakeholder concept has been generally acknowledged among IS researchers (e.g. Soja, 2015; Sudevan *et al*., 2014; Pouloudi and Whitley, 1997; Orlikowski and Gash, 1994; Gallivan, 2001; Lederer and Mendelow, 1990). Lyytinen and Hirschheim (1987: p. 263) defined IS failure as "the inability of an IS to meet a specific stakeholder group's expectations". A stakeholder in an organisation is defined by Freeman (1984: p. 46) as "any group or individual who can affect or is affected by the achievement of the organisation's objectives''.

Boonstra (2006) claims that ERP implementation can affect the interests of stakeholders of the ERP system, and groups may react differently in influencing the course of events. Additionally, Boonstra (2006) asserts that the design of the ERP implementation should be altered in ways that are more consistent with stakeholders' interests. Therefore, ERP implementation can be seen as "a negotiation process where different parties try to use the project to defend or to advance their individual or group interests" (Boonstra, 2006: p. 51). This may add to the complexity of ERP implementation, since different groups of stakeholders have different interests regarding how the ERP should work. This can also be experienced in a variety of ways by supporting, resisting and/or influencing the implementation process. In spite of this complexity, it is appears from the above discussion that the involvement of key stakeholders is critical to the successful implementation of ERP system.

Stakeholders can be classified as either internal or external to an organisation (Adelakun and Jennex, 2002). Freeman (1984) argues that a broader array of people, groups or organisations should be considered as stakeholders, including the nominally powerless. On the other hand, Eden and Ackermann (1998) state that stakeholders should be identified according to their interest and power, while other stakeholders may become significant at later stages of the project lifecycle, and therefore can be included as the dynamics of stakeholder management change their perceptions. Studies on critical success factors (CSFs) (e.g. Li *et al., 2017*; Shaul and Tauber, 2013; Ram and Corkindale, 2014; Al-Mashari *et al.*, 2003; Brown and Vessey, 2003; Burns *et al.*, 1991; Davenport, 2000; Esteves and Pastor, 2000; Holland and Light, 1999; Nah, Lau and Kaung, 2001; Soja, 2006) in developing countries have helped to identify the key representative stakeholders of ERP implementation. The key stakeholders identified as having a significant influence on ERP implementation are top management, vendors, change agents, external consultants, the project manager, implementation teams, the project champion and users.

According to Green (1995), top management includes the CEO and all the CEO's subordinates who are responsible for organisational policies. In most instances, top management is represented in the ERP project by the steering committee and the project sponsor. Top managers tend to regard ERP as any other standard software, considering the implementation process to be a pure technological challenge; as a result, top management fails to recognise that ERP may significantly change the operational norms of the organisation (Davenport, 1998; Umble *et al.,* 2003). Umble *et al.* (2003) argue that these managers should change their approach and realise that their ultimate objective is the business process and not software implementation.

The existence of a project champion, who might also be the project sponsor, is crucial to the success of the project (Altuwaijri and Khorsheed, 2011). According to Humphrey (1989), a champion agent is someone who maintains focus on the goal, strives to overcome obstacles, and refuses to give up when facing adversity. Maidique (1980: p. 64) defines a project champion as "A member of an organisation who creates, defines or adopts an idea for a new technological innovation and who is willing to risk his or her position and prestige to make possible the innovation's successful implementation". On a related note, the matter of the ERP project champion is also an important one. This is one of the leading factors that contribute to the successful adoption of a new ERP system (Remus, 2006) even though it is not officially credited (Esteves, 2004). The role is so important that an ERP project champion becomes the central character who administers the expected change during the length of the project with a keen eye on the technology's capacity and business objectives for the project. Additionally, an ERP project champion has to drive motivation in the organisation's teams to follow the newly evolved system and leave the old one behind (Loh and Koh, 2004). As far as the matter of mentions is concerned, literature on innovation lists ERP project champions among Critical Success Factors (CSFs) (Maidique, 1980; Chakrabarti and Hauschildt, 1989; Markham *et al.*, 1991). Therefore, it is crucial to the success of an ERP project that the assigned project champion is somebody with advanced and thorough knowledge of project management – who is sincere to the ERP project in question (Stratman and Roth, 2002; Zhang *et al.*, 2003; Nah and Delgado, 2006; Sedera and Dey, 2006; Bradley, 2008).

It is therefore understood that the project champion works as the implementer of innovation and has to be somebody who clearly understands the strategic objectives behind the project and the technological requirements to translate these objectives into operations. This is why the role is of utmost importance to every stage of the process (Somers and Nelson, 2004). In fact, the entire team that works for the implementation of the changes in the organisation must have a similar level of understanding of the requirements, objectives, and capacities so that efficient ways are found and impasses avoided. It is this team of execution agents that draws the parameters and define scope of the project, establishes the progress milestones and benchmarks work as it reaches these milestones (Bishnoi, 2011). This team, under the supervision of the project champion, is also often the group that plots the length of the project and executes many other activities during the project (Tsai *et al.*, 2004).

Umble *et al.* (2003) are of the opinion that these ERP project implementation teams should comprise members with cross-functional backgrounds so that the unit has all the necessary and various skills required to get their job done with effectiveness and efficiency. This allows organisations to entrust them with the project fully and confidently, believing the unit will work as a team of effective decision makers (Ehie and Madsen, 2005; Nah and Delgado, 2006; Nah *et al.*, 2007; Kim *et al.*, 2012). Moreover, with the establishment of the key role this team plays in the success of an ERP project, it is also understood that they will be given due liberties to make decisions (Nah *et al.*, 2003; Nah and Delgado, 2006; Sedera and Dey, 2006).

An ERP system can be successfully implemented only if the entire project is managed effectively according to a certain model and framework (Umble *et al.* 2003). Finney and Corbett (2007) argue that project management is concerned with the ongoing management of the implementation plan. This means that it is not limited to the planning stage, but also involves the allocation of responsibilities of various players. During the planning stage, the key leaders of organisations should decide if they want to implement a standard ERP system and adapt to its pre-developed functionality, or if they want to modify the software according to the needs of the organisation (Holland *et al.,* 1999). Before initiating the project, the scale must be explicitly determined and the project scope must be drafted such that it recognises the necessary modules that must be implemented and the procedures that require a modification.

Many organisations have an existing organisational structure and procedures that may not be compatible with the models and tools provided by ERP solutions. For these organisations, even if the adjustability of the ERP system is great, it will still have an impact on the strategy, organisation and culture of an organisation (Umble *et al.*, 2003). Implementing an ERP system can also result in a noticeable effect on the culture of the organisation. All the people involved should be aware and prepared for the transition, so that unsuccessful implementation can be avoided. As long as a business uses appropriate practices, it will be able to adapt itself to the ERP system. Moreover, an ERP system also makes it possible to cater to a larger amount of information and improve processes to a greater extent than what seemed feasible initially (Umble *et al.*, 2003). Being resilient is the key to fully exploiting the possibilities that ERP systems create (Sherrard, 1998). Therefore, the amount of change that ERP beings to any organisation calls for more appropriate change management. Schumechar (1997: p. 33) argues that "change management deals with how people are being affected by organisational change of any kind, and what interventions have to be undertaken to make the change effort a success for the customers, the organisation owners and the people working for the organisation". Hence, Al-Mashari and Zairi (2000) demonstrate that the successful implementation of ERP needs high capabilities of change management.

Typically, the vendor develops and sells the ERP system. They are also capable of implementing the system, and hence, can fit the role of both ERP vendor and ERP consultant (Haines and Goodhue, 2003). They even offer training sessions to educate users about their products. The importance of vendors as an enabling factor of ERP implementation is confirmed by a number of studies (Wei and Wang, 2004; Shehab *et al.,* 2004; Everdingen *et al.,* 2000; Sprott, 2000). Moohebat *et al.* (2010) suggest that developing countries are dependent upon ERP vendors. In addition, Somers and Nelson (2004) stated that the partnership between the implementing organisation and the vendor is extremely crucial throughout the ERP lifecycle. Since vendor-user knowledge gap can create a major obstacle for effective ERP system usage. In addition, the expertise and knowledge required by users to capture the intent of the system developers cannot be taken for granted (Nwankpa and Roumani, 2014).

Therefore, using the technology in ways expected by system designers and developers can present a big challenge for users.

The task of the consultant is offering support by aiding the implementation process. They impart additional knowledge, skills or just work force. The consultant is required to have detailed knowledge regarding the ERP system and its process of implementation. Haines and Goodhue (2003) state that a consultant should possess the knowledge for implementation in an organisation. It is essential to note that it is rare for an implementing organisation to hold the required information in-house; hence, a consulting party becomes a necessity (Haines and Goodhue, 2003). Hossein (2004) asserted that it is not recommended for organisations to attempt to implement their ERP systems in-house, and they should use professionally trained consultants to assist in the implementation of ERP systems, since most businesses have very complex applications and processes throughout their functional units. ERP system implementation will have a substantial effect on staff work practices, requiring training and orientation, which, when provided by external consultants, will result in the impact and results being stronger (Abbas *et al.*, 2013). Although vendors may not have any influence on the implementation climate, the implementers and consultants have a major influence on the climate of ERP implementation.

Similarly, the role of the users as the project's stakeholders is of great significance as well. It was stated in the previous paragraphs that project champion teams are also expected to streamline adaptation to the new system throughout the organisation so that all users can be motivated to move on to the new system in place instead of resisting it, which is one of the key causes of ERP implementation failure (Holsapplem *et al.*, 2005). This kind of resistance occurs when users find the new systems difficult to adapt to (Markus, 1983). Their limited skills do not allow them to manoeuvre the new system easily and, in turn, they may resist the system (Rogers, 2003). If this problem arises on critical points across the organisation's network, the overall satisfaction with the ERP project goes significantly down. Users may also have predetermined some negative notions in mind about how the ERP project may affect their job, roles, and performance based on their limited knowledge of the system.

Hence, users' acceptance of the new ERP system is also critical to its success (Lewis and Seibold, 1993).

ERP projects are, thus, long and demanding. They require that technical teams work hand in hand with business managers, all the while keeping the target users on board (Loh and Koh, 2004). The most unpredictable of these groups are the users, who are a majority and are different from one another in terms of skill, preferences, education, experience, knowledge, habits, training, *etc.* (ISO 13407, 1999). Consequently, managers and users have vastly different expectations of an ERP project (Amoako-Gyampah, 2004). Variety of industry is another way how managers and users have such different perceptions of ERP projects because it means they have quite different experiences with regard to IT, ERP, and business process management at large (Huang and Palvia, 2001).

Aladwani (1998) asserted identifying and evaluating the various groups within the target users of the new system must be the initial step of managing an ERP project. In this regard, Wu and Wang (2006) discovered two key groups among the end-users of a new ERP system. According to these scholars, the first group of users are those who are selected for a pilot run of the new system and are also responsible for training the remaining end-users. This type of users are selected based on some experience in the past with ERP or new IT systems (Esteves, 2004).

The other group of users have lesser or no experience in the past with ERPs or new IT systems and are left to be trained in the second phase of the ERP system (Esteves, 2004; Wu and Wang, 2006). This leads the researcher to believe that users' inclusion in the earlier stages of the ERP project implementation may result in lesser resistance at the time of the new system's application. Sternak and Bobek (2006) also arrived at the same conclusion. When they are part of the project from the beginning, the end-users have more stakes in the process and their input is taken into account from the initial stages of the project. This may be done by choosing representatives of every target end user group of the prospective ERP system. These representatives may be included in two key stages of the project: the planning stage where definitions are established for the project's needs and objectives and the implementation stage where the program is tested on the system (Zhang *et al.*, 2002). It has already been noted in the previous paragraph that ERP systems are already tested with some of the target users in many organisations, which means their representation is included in the second phase but should also be used in the initial stage.

This sheds some light on the problem of training users to use the ERP system advantageously, which are complex software systems and difficult to get used to even for users with some background in IT usage (Woo, 2007). A connection has already been found in the literature between training/education and IT satisfaction (Holsapplem *et al.*, 2005). With particular regard to success of ERP systems, Nah *et al.* (2003) found adequate training of users can lead to significantly greater chances of ERP success. This knowledge also leads to how ERPs fail due to user resistance. When they have not fully understood the new system but face pressure from their managers to employ the system, users develop their own processes based on such aspects of the new systems that they understand and can use (Umble *et al.*, 2003; Bajwa *et al.*, 2004). Conclusively, it may be said that ERPs can only succeed if the end users are able to operate them fully and achieve target outcomes.

The above discussion indicates that, recognising and understanding stakeholders' roles and expectations reduces the impact of the ERP implementation's drawbacks and ensures the alignment of its key characteristics with the motives of the key stakeholders, hence ensuring, in turn, the successful implementation of ERP. This is why this research will investigate the key stakeholders and their roles as one of the key factors for the successful implementation of ERP system in the context of Saudi Arabia. The key stakeholders include top management, vendors, change agents, external consultants, project manager, implementation project teams, project champion and users. These groups could have a major effect on the ERP implementation, either positively, aiding the implementation project. Alternatively, they could, in some cases, hinder the process of implementing such a complex system. This explains the reason for this research to identify the key stakeholders and investigate whether there are others, such as the government, whose role may have to be taken into consideration in developing countries such as Saudi Arabia. Table 3.3 shows key stakeholders involved in ERP implementation.

Table 3.3: Key stakeholders influencing ERP implementation

Key Stakeholders	Selected sources
Top management	Sudevan *et al., 2014*; Ahmed and Khan, 2013; Averweg and Erwin, 1999; Dawson and Van Belle, 2013; De Jager, 2010; Dlodlo, 2011; Hart, 2010
Change agents	Sudevan *et al*., 2014; Ahmed and Khan, 2013; De Jager, 2010; Dlodlo 2011; Hart, 2010; Kalema *et al.*, 2014; Gibson, 2012; O'Donovan *et al*., 2010
External consultants	Sudevan *et al*., 2014;Dlodlo, 2011; Kalema *et al.*, 2014; Singh and Wesson, 2009)
Vendors	Sudevan *et al*., 2014; Wei and Wang, 2004; Shehab *et al.*, 2004; Everdingen *et al*., 2000; Sprott, 2000
Project manager	Sudevan *et al.,* 2014; Dawson and Van Belle, 2013; De Jager, 2010; Dlodlo, 2011; Hart, 2010; Kalema *et al.*, 2014; Gibson, 2012; Shah *et al.*, 2011; Singh and Wesson, 2009; Smuts *et al.*, 2010
Implementation teams	Ahmed and Khan, 2013; De Jager, 2010; Dlodlo, 2011; Hart, 2010; Smuts *et al.*, 2010)
Project champion	Sudevan *et al.,* 2014; WnKalema *et al.*, 2014; Singh and Wesson, 2009; Finger, 2005
Users	Sudevan *et al.,* 2014; Ahmed and Khan, 2013; Averweg and Erwin, 1999; Dawson and Van Belle, 2013; Dlodlo, 2011; Kalema *et al.*, 2014; Van Schalkwyk and Lotriet, 2011; Shah *et al.*, 2011

Source: The researcher

3.11.3 ERP Implementation Strategies

This section will identify the main ERP implementation strategies in order to reveal the complexity of each type, and the factors that may determine the success of their implementation. The literature (Cooke and Peterson, 1998; Mandal and Gunasekaran, 2003) suggests that an ERP system can be successfully implemented only after considering a number of factors. Implementing ERP systems successfully requires an implementation strategy that is appropriate for the implementing organisation. Furthermore, it was found that SAP's (Systems, Applications, and Products), in general, face a very high percentage of failure due to the absence of a strategic plan (Cooke and Peterson, 1998). When backed with a strategic plan, they perform very well and generally succeed. However, it is imperative that this strategic plan is based on a set of clear business objectives and specific outcomes that the organisation expects to achieve with the new system in place. This view is supported by Cohen and Levinthal's (1990) study on the concept of absorptive capacity, which is a theory that claims any given business organisation has its limit of absorbing knowledge related to technology. This limit depends on the collective knowledge and experience of the employees in the organisation. Therefore, Organisations are expected to accumulate necessary competencies and a knowledge base that they can use to clearly define what a certain ERP system is expected to achieve for them. They should clearly state what a particular ERP is needed for, how it is to be executed, and what needs of the organisation's business objectives it will address (Umble *et al.*, 2003). As Mandal and Gunasekaran (2003) suggest, the use of certain strategy, will determine how the related changes can be successfully absorbed at various parts of the organisation. Moreover, Khanna and Arneja (2012) claim that if the wrong strategy is followed, there is a high chance of failure.

Khanna and Arneja (2012) and Leon (2009) assert that there are five main strategies that can be followed for ERP implementation: big bang, phased, parallel, process line and hybrid. The main aspects of these five strategies are people, process and technology. ERP implementation strategies are based on the concept of making the transition from a legacy traditional system into a new ERP system. Similarly to any innovation, organisations should evaluate these strategies and select the ones that best serve their needs and are compatible with their environment (Rogers, 1983). If the wrong strategy is followed or the organisation does not recognise the three main aspects (people, process and technology) of an ERP implementation, there is a high likelihood of failure (Khanna and Arneja, 2012).

In the big bang strategy, the ERP system replaces the current system in an instant. All applications and modules are installed simultaneously throughout the organisation. The prime advantage of this approach is that there is no need to interface between the old and new systems (Welti, 1999; O'Leary, 2005). Since there are no added steps, the costs can be reduced provided the implementation is planned properly. Organisations also become motivated by the fact that no interface is required, and the implementation time is drastically reduced. However, there is a major risk involved in using this strategy. After the implementation, if the new system becomes inoperable for any reason, all efforts would be lost. Moreover, the strategy can be implemented in just a short time, but the actual development of the plan is a time-consuming process (Khanna and Arneja, 2012). Curko *et al* (2012) argue that the size of the particular organisation certainly has an impact on the selection of strategy where smaller organisations are more likely to adopt the big bang approach. The majority of the early implementations of ERP systems based on the big bang approach encountered many problems, and were often failures (Khanna and Arneja, 2012). This is why Abbas (2011) suggests that today's organisations do not find this strategy preferable; increased resources are required when the system must become live.

The phased strategy, as its name implies, is implemented in phases and single modules are implemented, one at a time. This may take more time, but it is less complex. Initially, independent modules are installed in each business function, and later, steps are taken to integrate them. The phased strategy is one of the most common methods to implement ERP systems (Abbas, 2011). Every single unit can have their own perspective of the system and its database. The phase strategy reduces the implementation scope, which minimises the risks associated with installation, customisation and functionality of the ERP system. Obviously, since the modules are installed separately, they must be interfaced and made to work together until installation is complete. The new system and the old system must have some sort of interface so that they can be used together (Abbas, 2011). The average time for the entire strategy to be implemented is long, and so this approach is more preferable for use in a business that is very centralised.

The parallel strategy suggests, the adoption of a parallel approach which can provide a way for the new ERP system and the old system to work simultaneously for a certain period of time. The systems are dealt with separately and the inputs are provided to both systems simultaneously. The way the phased strategy is based makes it possible to continuously change individual modules before the date goes live. Consequently, more effective testing is conducted and more variations of outputs can be analysed.

The process line strategy separates the implementation process into distinguished phases that can be used to manage similar product lines and process flow. The old system is modified to the new ERP system in several steps. In the first step, the initial phase 1, or the first product line, along with related assets, is modified into the new ERP system. If this is successful, the transition of the second product line, or phase 2, takes place (Abbas, 2011). The first process line is often the simplest and only when this is accomplished effectively, that the resources are allocated to more challenging and complex process lines (Abbas, 2011). The benefit of the phased strategy lies in the fact that an organisation gradually becomes more confident with the new ERP system and there is a higher chance of success.

The hybrid strategy is the combined term used when more than one ERP implementation strategy is utilised for incorporating the system into existing business processes. Before this strategy can be used, various factors must be carefully considered, such as the size of the organisation, the locations at which transitions must be made, and the total number of sites. Generally, organisations with smaller and/or fewer sites follow simpler hybrid strategies than the ones utilised by large organisations (Abbas, 2011).

To summarise, the most used ERP implementation strategies are big bang, phased, parallel, process line and hybrid. The main aspects of these five strategies are people, process and technology which seem to require a high level of resources and absorptive capacity as well as appropriate organisational arrangements, procedures and routines. ERP implementation strategies are based on the concept of making the transition from a legacy traditional system into a new ERP system. The evaluation of these five strategies has helped in identifying their main advantages, disadvantages and technical, organisational and skills factors for their successful implementation. Appendix 2 provides a summary of the advantages and disadvantages of the ERP implementation strategies.

3.11.4 ERP Implementation Methods

This section will identify the main types of ERP implementation methods in order to reveal the complexity of each type, and the factors that may determine the success of their implementation. Each implementation type may require a different setting and different pre-implementation preparation; for instance, the scope of business process changes needs to be defined according to the implementation type. Parr and Shanks (2000) have divided ERP implementation methods into three main categories: comprehensive, middle road and vanilla.

The comprehensive method is ambitious in nature, and so is generally utilised by huge multinational enterprises comprising multiple sites across national boundaries, and which possess a high level of competencies and skills. The projects based on the comprehensive strategy are also large and incur higher costs. It therefore requires huge customisation efforts and resources. The term *customisation* refers to the changes and alterations made with an ERP system after its implementation or the test run phase. It refers to how specifically an ERP system is modified and what changes are made within the original version to address any issues that arose later. Such modifications are usually related to addition of features in the messaging system, user interface, and the code running underneath the program (Dittrich and Vancouleur, 2008). Furthermore, comprehensive customisation may be needed for ERP systems that were initially created without a clear and specific strategy. This leads to major customisations to the ERP system itself in addition to extensive process reengineering to align existing processes while the ERP itself is customised to match the ERP embedded processes (Kumar and Hillegersberg, 2000; Light, 2001).

Customisation of ERP functions is done parallel to the system’s regular operations and maintenance. Therefore, it can impede the task of support and maintenance. Furthermore, since customisation modifies functions in the software, the modifications make it difficult for the system to be updated for a new release, while it is already understood that retaining customised functions from the past versions can cost a lot (Light, 2001; Beatty and Williams, 2006). Some scholars believe that customisations should be avoided as much as possible because they can result in reduced progress of the whole project while opening doors to the possibility of new bugs in the code and, hence, the system itself (Koch *et al.*, 1999; Nicoulau, 2004; Nadhakumar *et al.*, 2005). It also hinders the vendors in the release of newer versions of the ERP, as the modified code in the older version will then have to be surgically inserted into the code of the new system before it can be tested and released to clients.

On the other hand, customisation allows for organisations to avoid any dramatic changes in their best practices, which allows them to retain their competitive edge. It also does not demand client organisations to make drastic changes in the way their personnel work. Nevertheless, a body of literature argues that customisation only results in wasted resources, like time and money spent on development (Soh *et al.*, 2000; Huang and Palvia, 2001; Hong and Kim, 2002; Arif *et al.*, 2005; Soh and Sia, 2005). Their argument is when an organisation purchases an ERP, it does not necessarily apply it on an as-is basis and some of the standard processes and functions of the system are already customised to fit the specific needs of the organisation so they do not lose their competitive advantage. Customisation, by definition, is modification done to alter functions and bring them closer to the client organisation's objectives and practices. If customisation is required after the system has been integrated into the organisation, it means the customary modifications done at the time of installation have either backfired or were done ineffectively (Soh and Sia, 2005).

A middle-road project concerns a method where customisation to the ERP system is made along with a considerable level of business process re-engineering (BPR), unlike the vanilla approach, where customisation is at its very minimum. This method is, as the name suggests, mid-way between the vanilla and comprehensive methods.

The third method of implementation, the so-called *vanilla approach*, is not complex in nature, and, thus, it involves minimal risks and requires a high level of expertise and competencies. This *vanilla approach* asserts that client organisations should be open to the idea of adopting the *vanilla* edition of the ERP they purchase – the vanilla version of a software program is the basic version with the default functions and processes in place with no, or very little, customisation (Shanks and Parr, 2000; Sirigindi, 2000; Yakolev and Anderson, 2001; Nah *et al.*, 2001; Somers and Nelson, 2001; 2004; Palaniswamy and Frank, 2002; Mabert *et al.*, 2003; Soh and Sia, 2005). As far as possible, software should not be modified (Summer, 1999). Customisation is avoided to reduce the chances of more bugs and errors as well as to benefit from the standard upgrades that come out from the vendor (Rosario, 2000). The vanilla approach hardly requires customisations to the ERP package, which makes it attractive to a majority of client organisations among the ERP's customers (Holland *et al.*, 1999; Parr and Shanks, 2000). Therefore, organisations should prefer changing some of their practices to find best integration with their chosen ERP with little customisation to the software code (Roberts and Barrar, 1992; Holland *et al.*, 1999). This kind of implementation is possible with currently popular re-engineering processes so that built-in ERP functions can be incorporated into the client organisation without need for customisation.

The vendors do not customise the ERP package or change any features; instead, the existing processes are remodelled so that the ERP system fits and can be deployed (Bancroft *et al.,* 1998). Aligning the business process to the software implementation is critical in this method (Holland *et al.*, 1999; Sumner, 1999). Yich (2011) states that vanilla ERP implementation reduces the complexities arising in a typical ERP implementation process, while costs are also lowered and maintenance is easier to manage. All this is due to the fact that there are hardly any customisation requirements (Haines, 2009). According to Chou and Chang (2008), if the organisational processes are aligned with ERP systems, businesses can enjoy improved coordination and higher efficiency. Consequently, the fundamental element of the vanilla ERP implementation type is to adopt the ERP system such that it is merged with existing procedures (Daneva, 2004).

The review of the literature on ERP implementation methods, suggests that some types of implementation could lead to a more complex and complicated implementation process. Three main methods which are found to be used in ERP implementation are named comprehensive, middle road and vanilla. They may require different settings and different pre-implementation preparations, and therefore more complex process re-engineering. For instance, comprehensive implementation makes the implementation more complex, since it requires extensive process re-engineering to align existing process with ERP embedded processes. This method may not be suitable for all organisations because of the level skills, competences and resources needed for its successful implementation. This calls for a careful evaluation of the different types, concerning their advantages, disadvantages and factors for their successful implementation. This evaluation can inform the selection and adoption of the most appropriate implementation type and plan.

3.11.5 ERP Learning and Knowledge Sharing

This section discusses the importance of learning as a crucial condition for innovation in order to investigate how learning affects the implementation of an innovation such as ERP. As discussed in chapter two, learning and knowledge sharing is a crucial condition for innovation. ERP is complex technology (Bingi *et al.*, 1999; Welti, 1999; O'Leary, 2000). It demands significant levels of learning on part of the end-users and using it effectively (Ke and Wei, 2006). Organisations and their personnel are sometimes required to build new skills to effectively implement an ERP in their systems. Therefore, it is understood that proper knowledge sharing, a clear plan for the new system's implementation, and an able project management team will be the three catalysts that are needed for effective integration of a new ERP system (Schniederjans and Yadav, 2013).

Moreover, the implementation of innovations such as the ERP system need a high level of absorptive capacity that enables a firm to acquire and assimilate a new Knowledge. Absorptive capacity is a mandatory requirement for innovation (Zahra and Goerge, 2002; Daghfous, 2004; Martin, 2005; Gray, 2006). Organisational learning and culture (Daghfous, 2004), knowledge accumulation and experience (Zahra and Goerge, 2002) form the backbone for Knowledge acquisition and assimilation. Therefore, a good absorptive capacity increases the success rate of ERP projects and decreases the probability of failure. Absorptive capacity reflects the ability of an organisation to effectively use the external knowledge and learning in order to achieve dramatic benefits such as sustainable competitive advantage.

In addition, the greater the usage by the end-users, organisations will achieve their goals of the ERP implementation, and the greater the extent of the firm's competitive advantage achieved. Jonas and Bjorn (2011) claim that ERP system usage has been the most frequently used measure of IS success. However, Fichman and Kemerer (1999) note that the successful deployment of a system does not ensure automatic assimilation and use. Moreover, ERP implementation is a necessary but insufficient prerequisite for obtaining the value and benefits (Jonas and Bjorn, 2011). Such value and benefits can only be claimed through efficient utilisation of the ERP system (Nwankpa and Roumani, 2014). Incidentally, it may be argued that organisation that are implementing an ERP system for the first time may very well let their practices be dominated by this apparently brilliant new system that comes with a long list of features that the people at the organisation have never been able to work with in the past (Huber, 1991; Kraemmerand *et al.*, 2003; Ahmed and Khan, 2013; Ramburn and Seymour, 2014). This leads to the ERP at least partially taking over the organisation's strategy component as well as the culture it has maintained until now (Davenport, 1998). Since ERP systems and the solutions they offer are connected with a certain list of protocols and predetermined possibilities (Kraemmergaard, 2000), they can adapt to an organisation's specific strategy, objectives, and practices only so much and the client organisation new to using an ERP system may resort to aligning their practices and processes with functions available within the ERP (Boudreau and Robey, 1999).

To summarise, learning and knowledge sharing are crucial to the successful implementation of ERP. Like most innovations, the successful implementation of ERP system is dependent on the availability of an effective knowledge base. As a result, with appropriate skills, competencies and organisational learning, the implementation plan, as well as capable project management, will help improve the likelihood of successful ERP implementation.

3.11.6 ERP and Culture

As discussed in chapter two, organisational culture has an important influence on an organisation's innovativeness. ERP is a complex project to the extent that cultural values of its users will likely have an impact on its implementation (Rajapakse, 2012;

Ignatiadis, 2007). The literature suggests that ERP implementation success is positively associated with organisational culture (Schniederjans and Yadav, 2013; Bock *et al.,* 2005; De Jager, 2010; Kalema *et al.*, 2014). According to Ignatiadis (2007), it is important to recognise culture as an important factor influencing the use of the ERP system. As such, Organisational culture was seen to be a central concept that affected the importance given by users and managers to the ERP system, the training received by users, and the support given to them. Literature suggests that such possible changes in the organisation's culture should be anticipated and senior managers should not only communicate them with the rest of the personnel but also help them be prepared for these changes in time (Singh and Wesson, 2009). This strategic exercise of the senior managers can play a potential role in the success or failure of the new ERP the organisation is adapting to (Wenrich and Ahmad, 2009). Johri and Nair (2011) second this assertion and posit that such management with regard to the culture of the organisation can influence the success of the ERP system to a significant degree. It has already been asserted that organisational culture can be a significant impediment in effective application of IT related systems in organisations (Chappell and Feindt, 2000; Jones *et al.*, 2003; Alawi *et al.*, 2005; Siriluck and Speece, 2005; Al-Shehry *et al.*, 2006; Pai and Yeh, 2008). At the same time, culture that inspires communication can play a positive role in the success of the ERP project (Stewart, 2000; Jones and Price, 2001; McNurlin, 2001; Loh and Koh, 2004).

In various studies about organisational culture, a number of factors have been identified that may affect ERP implementation. For instance, Tsai and Hung (2009) discovered senior managers' ineffective attempts at getting their subordinates and teams to trust the new system they want integrated into the organisations' operations could strongly affect the ERP's chances of success. The study further discovered that this problem resulted in the personnel across their studied organisation's various departments became insecure and somehow believed the ERP would threaten their status and role in the organisation, immediately becoming resentful of the new system. Subsequently, this kind of a situation in an organisation can result in long-term issues, leading the strategic managers of the organisation to recruit new human resources on a significant scale who would be new and devoid of the negative perceptions for the ERP.

The effects of organisational culture on the success of an ERP are not direct, however (Gerwin, 1993). The foremost manner in which culture influences the success or failure of an ERP system is through the rift that develops between a majority of the junior level employees – who begin to distrust the new system – and the senior managers – who understand the strategic needs of the ERP and want it to succeed (Nahm *et al.*, 2004). The implementation team working under the supervision of the project champion or the project manager who is directed by these senior managers to see through the project is affected by this rift and cannot effectively execute knowledge sharing with the various teams and employees regarding the new system (Clark *et al.*, 1974; Jones *et al.*, 2006). Furthermore, the structure of the organisation also has a role to play in such weak communication (Nahm *et al.*, 2004). Organisational structure refers to the distribution of authority across the managerial levels and how the teams and departments are formalised (Swamidas and Newell, 1987; Nahm *et al.*, 2003).

Therefore, organisational culture is found to have substantial impact on ERP implementation. There is a number of cultural factors that need to be taken into consideration and managed in order to ensure a successful implementation of ERP system These factors include trust, communications, decision-making process, training and education and organisational structure. These set of factors have been also identified in chapter two as impacting the effective implementation of on innovation.

This section has investigated and identified the key factors for the successful implementation of ERP as a complex system of innovation. These factors include the main motives for ERP implementation, key stakeholders, ERP implementation strategies and methods, the importance of learning and the need for an organisational culture that support the development and implementation of ERP systems. These factors which are believed to be of most importance in supporting learning and knowledge sharing with regards to ERP implementation.

3.12 Summary

This chapter builds on Chapter Two and defines ERP as a complex system of innovative solutions based on a set of IT business applications. The objective of this innovative solution is to assist businesses with enhancing their performance and competitiveness through the effective coordination and integration of numerous processes, business units and functions. Moreover, the historical development of ERP systems is discussed to show how these systems become an integrated complex solution similar with the fifth generation of innovation as defined by Rothwell (1994).

The chapter has investigated and identified the key benefits, drawbacks, limitations and key characteristics of ERP as complex innovation in order to better understand the whole process and more particularly the stage of implementation. Furthermore, the importance of the ERP implementation process was discussed and the main stages of the implementation of ERP as an innovation were identified.

In addition, the key factors for the successful implementation of ERP systems were also discussed and identified. The key motives were identified and they indicated that ERP, like any innovation, is motivated by several different factors, which are essentially aimed at enhancing the performance and competitiveness of organisations. The literature reviewed in Chapters One and Two has helped to highlight the key factors and stakeholders that affect ERP innovation. Moreover, this chapter has also examined and identified the main strategies and methods for the adoption and implementation of ERP as an innovation. It has also identified and discussed the importance of learning in ERP implementation in order to develop an appropriate level of absorptive capacity, the need for organisational change, and culture, as main factors associated with the successful implementation of ERP as an innovation.

Finally, the key findings from both theoretical chapters which will form the basis of the research empirical investigation, are illustrated in Table 3.4.

Table 3.4: Key findings from both theoretical chapters that will form the basis of the research empirical investigation.

Attributes and Factors	Key findings		
ERP main characteristics	• Comprehensive, • Uses a common database	• Integrates all activities and transactions • Modular and open	• Flexible • Has the ability to be linked to external entities
Key ERP systems limitations and drawbacks	• Configuration • Cost • Gaols and benefits disparity • Risk of losing competitive advantage	• Resistance • Time consuming • The complexity of ERP systems • ERP integration	• Economy, culture and fundamental infrastructure • Lack of technology awareness
ERP implementation typology	• Radical • Incremental	• Organisational • Technical	• Administrative • Process
Main stages of ERP innovation implementation	• Needs intensifications • Knowledge awareness	• Selecting the innovation • Planning	• Implementation
Key factors for the successful ERP implementation as an innovation			
Key motives affecting ERP implementation	• Replace legacy systems • Solve the Y2K problem • Ease of upgrading systems • Simplify and standardize systems • Pressure to keep up with competitors	• Improve interactions and communication with suppliers and customers • Restructure organisation • Gain strategic advantage • Link to global activities	• To meet to fierce competition • Reduce cost • To manage supply chain activities • Improve quality • Process improvement
Key stakeholders influencing ERP implementation	• Top management • Change agents • External consultants	• Vendors • Project manager • Implementation teams	• Project champion • Users
Innovation diffusion factors	• Relative advantage • Compatibility	• Trialability • Observability	• Complexity
ERP implementation strategies	• Big bang • Phased	• Parallel • Process line	• Hybrid
ERP implementation methods	• Comprehensive	• Middle road	• Vanilla.

Main learning dimensions affecting ERP implementation	• Managerial commitment • Openness and experimentation	• System perspective	• Transfer and integration
Absorptive capacity	• Acquisition • Exploitation	• Assimilation	• Adaptation
Main learning strategies affecting ERP implementation	• Action learning • Active learning	• Experiential learning • Cooperative learning	• Problem-based learning • Coaching and mentoring
Key cultural norms affecting ERP implementation	• Organisational structure • Freedom and risk-taking	• Trust • Conflict and debates	• Communications and dialogue • Participative decision making

Source: The researcher

Chapter Four: Background to the Case of Saudi Arabia

4.1 Overview

This chapter investigates and discusses relevant aspects of Saudi Arabia, such as the political, economic, global economic, cultural and innovative aspects of the country, in addition to financial and performance indicators, and ERP implementation, in order to justify choosing Saudi Arabia as a context for this study. Furthermore, this chapter ultimately aims to comprehend how any issues already present in Saudi organisations can adversely influence the success of a new ERP system. Understanding a business problem in the particular context of the environment wherein it exists is important to finding the correct solution to the problem being studied in research, especially regarding ERP systems (Odhiambo, 2010; Angeles, 2013). It is, thus, important that a study focused on the successful implementation of ERP system should analyse both the internal environment and culture of the organisation as well as the external environment in which the organisation exists (Kwon and Zmud, 1987; Lai and Mahapatra, 1997).

4.2 The Political Context

Saudi Arabia (officially, the Kingdom of Saudi Arabia) was unified by King Abdulaziz in 1932. It occupies most of the Arabia Peninsula. It is one of the largest countries in the Middle East, occupying an area of about 2,150,000 square kilometres (CIA Fact Book, 2017). The latest estimated population statistics in 2017 showed that the population of Saudi Arabia was then 28.5 million, of which 37% were immigrants, according to United Nations (2017). The Kingdom of Saudi Arabia (KSA) follows a monarchy system of government, while the Judiciary of the nation is driven by the Islamic law, also called the Islamic Shariah. According to this body of religious laws, a Council of Ministers is the supreme representative body of the government, implementing the law across the kingdom under its guidance (Ministry of Information, 2004).

The King performs the unified role of a judicial, executive, and legislative leader of the country and is essentially the Prime Minister, guiding and leading the Council of Ministers. Additionally, the country has recently formulated a *Shoura*, which is also a supporting governance body and comprises learned scholars and professionals so they can provide collective suggestions to the Council as well as the King (Majlis Ash-Shura, 2017). Furthermore, KSA joined the UN in 1945, is a respected member of the Muslim World League, the Arab League, and the Gulf Cooperation Council (United Nations, 2017).

4.3 The Economic Context

KSA is one of the largest producers of oil and natural gas around the world, and supports its economy fundamentally with the trade of these natural resources. Petroleum sectors accounts for over 86% of the country's annual revenues and over 40% of its GDP (CIA Fact Book, 2017). KSA has a population of around 32.5 million individuals, a GDP of $638 billion, and a parity of purchasing power value of 53,624 (Global Innovation Index, 2017). In addition, KSA is the fastest growing state with regard to income per capita (CIA Fact Book, 2017). The government owns a majority share in the oil sector assets and rigorously controls the sector. It has been consistently in pursuit of diversification and economic reform, especially since it became a member of the World Trade Organisation in 2005.

All these efforts led to the announcement in April 2016 of the so-called Vision 2030, which is a bold and broad collection of social and economic reforms (CIA Fact Book, 2017). Vision 2030 is more or less the Kingdom's view of where it wants to be in 2030 in terms of economic growth and prosperity. The country aims to achieve a vibrant society, a thriving economy, and an ambitious nation by the deadline attached to the Vision (Council of Economic and Development Affairs, 2016).

The Vision is focused on enhancing the share of the private sector and investment in the country's economy so that an impression of diversification develops, which, so far, is a dream in the country's tightly controlled market. This diversification is initially aimed at the petrochemical, natural gas exploration, telecom, and power generation sectors. At the same time, the Vision promises a rigorous inclusion of Saudi nationals in the country's workforce. This aspect of the Vision is based on the fact that the Kingdom has long been dealing with the issue of unemployment of its nationals unsuccessfully with over six million foreigners working in the economy. Incidentally, the Vision wants to target the Saudi youth to seek employment and become contributing citizens of the state. For now, this group by and large lacks the levels of technical skills and formal or vocational education that may be favoured by employers in the private sector (CIA Fact Book, 2017).

The state is insistent on achieving this goal. In 2013 alone, KSA spent over $400 billion on upgrading its infrastructure and creating more jobs for its local population. In addition, five economic and industrials cities have been built, aiming to diversify the economy and create more jobs. Nevertheless, there is still a need for more efforts to foster the culture of innovation in Saudi organisations.

4.4 Global Indicators Context

KSA joined the WTO in 2005 (World Trade Organisation, 2005). It is an active participant in the activities of the World Bank and the International Monetary Fund (IMF). It also happens to be among the founding members of OPEC - The Organisation of Petroleum Exporting Countries, which is the international body that manages and determines the pricing policy for oil so that international oil markets are managed efficiently.

KSA also happens to be the only Arab member of the G20 - The Group of Twenty, which is another international organisation that brings together some of the emerging economies and some of the developed economies of the world. KSA is also a leading member of MENA - the Middle East and North Africa - in numerous indices around the world, including the GOI - the Global Opportunity Index, the GII - the Global Innovation Index, and the GCI - the Global Competitiveness Index. These indicators are important reflections on KSA's economic and financial performances.

Global Competitiveness Index (GCI): Saudi Arabia is currently ranked 29th out of 138 countries in the Global Competitiveness Index (World Economic Forum, 2016). The country is ranked 4th globally for 'Macroeconomic Environment', which stood as its best-performing category. These ranking attributes are a result of the nation's institutions, proficient markets, advanced, sophisticated businesses, high-macroeconomic soundness and its prolific use of Information and Communications Technologies (ICT). In terms of pillars of the GCI, Saudi ranked 24th in Institutions, 31st in Infrastructure, 68th in Macroeconomic environment, 51st in Health and primary education, 46th in Higher education and training, 41st in Goods market efficiency, 65th in Labour market efficiency, 47th in Financial market development, 41st in Technological readiness, 31st in Business sophistication and 42nd in Innovation. The advancements that Saudi Arabia has made in its rankings are attributed to the initiatives that have been taken to strengthen education, particularly in terms of the quality of maths and science training in management and primary education. However, the country needs to have a more flexible labour market to ensure that talent is used efficiently (World Economic Forum, 2016).

Global Entrepreneurship Index (GEI): Saudi Arabia is currently ranked 30th in terms of entrepreneurial ecosystems, among the 137 countries in the GEI 2017 (Global Entrepreneurship and Development Index, 2017). This positions Saudi Arabia higher than 80% of countries in this index, including Hong Kong (32nd) Spain (33rd), Italy (46th), South Africa (55nd, China (48th) and India (69th). Similar to other indices, Saudi Arabia is also a leader in taking a different strategy towards global engagement and integration in the MENA region (Global Entrepreneurship and Development Index, 2017).

Global Innovation Index (GII): Out of 141 countries, Saudi Arabia took the 57th position in the GII, retaining its place as one of the most innovative nations in the MENA region (Global Innovation Index, 2017). Saudi Arabia is ahead of Brazil, India and almost all Arab countries except the UAE and Qatar. In addition, it has been positioned within the best 50 countries in innovation worldwide for many years. The GII framework considers innovations to be more generic and horizontal in nature, including innovations in business models, as well as social and technological innovations.

The innovation Input and Output are ranked 46th and 66th respectively. This, however, indicates that the innovation input score in Saudi Arabia is slightly higher than the output. That means that Saudi Arabia is realising less innovation output for its innovation inputs. Therefore, the gap between inputs and outputs needs some improvements and investments in the *input pillars*, including business sophistication, market sophistication, infrastructure, human capital and research, and institutions. The results will influence the *output pillars*, including creative outputs, technology outputs, and knowledge. This is confirmed by the innovation efficiency index, where Saudi Arabia ranks 96th, indicating that the country is not efficiently utilising its innovation inputs in order to realise better innovation outputs. Moreover, such a ranking in the most recent years calls for some serious consideration of how the national innovation systems are coordinated and managed.

4.5 The Education Context

The nationwide public educational system in KSA comprises 24,000 schools, 59 universities, and a large number of other educational and training institutions, including vocational colleges. The education system is free for every Saudi national and grants health services, books, and free education. However, the system is hindered by the low level and sometimes lack of university-to-industry interactions. According to Erasmus *et al.* (2009), the importance of human resource development (HRD) cannot be overemphasised as a key role player in making sure organisations stay competitive in uncertain times and atmosphere.

In Saudi Arabia, the government is attempting to tackle unemployment levels through a policy of replacing foreign workers with Saudis and forcing both public and private sectors to recruit Saudis for jobs that do not exist, rather than by strengthening the country's approach to education and vocational training (Achoui, 2009). Nevertheless, KSA is heavily investing in education and increasing not only the literacy rate of the nation but also building the professional skills of the young generation. In recent years, KSA has added the King Abdullah University and the Princess Noura Bint Abdulrahman University for Women in its educational portfolio. Additionally, the government is investing in making technical education and administrative training key areas of focus for the education of their youth. The General Organisation for Technical Education and Vocational Training is working alongside the Ministry of Labour and Social Affairs to manage a majority of the country's institutes for vocational training and technical education. These institutes are focused on providing comprehensive education and vocational training in a number of technical fields, including auto mechanics, electro mechanics, metalwork, machine tooling, *etc.* (Education and Training Services in Saudi Arabia, 2010).

4.6 The Cultural Context

As a culture, KSA must be studied with a number of critical factors governing it. The country's culture is driven by millennia of strong tribal values, a bicentennial monarchy, 1,400 years old religious law, and a rising element of modernisation. These conflicting aspects of the country's culture make it an interesting study for any student of the social sciences. The population is mostly driven by family and close tribal relationships, which limit their occupational and geographic activity (Baker *et al.*, 2010). Besides this, women make a small percentage of the country's workforce, while the age median of professionals represents a much younger individual than those in the developed economies (Al-Gahtani, 2004).

Hofstede's (1983) cultural dimensions represent the most cited reference about culture within the information systems discipline (Straub *et al.*, 2002; Voros and Choudrie, 2011; Cardon and Bryan, 2008). Studied under Hofstede's (1980) popular four dimensions, KSA stands at 80 in the Power Distance Index (PDI), and happens to fall in the top 20 indexed states of the world. This information is an important factor in how the organisations and managers behave in the country. Employee empowerment, which is often cited as of the main condition for the development of innovation, is disliked by managers. This can in fact be considered as connected to the state's PDI ranking. As a result, employees are not approached for input on matters important to business decisions (Bochner & Hesketh, 1994). This kind of organisational governance can only lead to a lack of motivation and engagement of employees to creativity and innovation which can an impact on the implementation of innovation such as ERP. Al-Gahtani *et al.* (2007) referred to the state of IT in KSA and suggested the country's culture should encourage technology users particularly with its low rankings on individualism and current PDI value. However, the current state of organisational governance and its effects trump this expected outcome and lead the practices in the opposite direction. In a society where individuals have high uncertainty avoidance values (Hofstede, 2001), people construct false preferences and rules to try and avoid unexpected outcomes (Agourram, 2009). Thus, the introduction of innovation can be fundamentally challenged by the general social mind-set of KSA where people take change as a threat, which is the ultimate goal of any ERP system. It is clear that innovations such as ERP require from organisations to motivate and engage their stakeholders on all levels of the hierarchy of their business through training, communication, and participation to decision making (Everdingen and Waarts, 2003). People in the Saudi culture are easily influenced by the information they come across while interacting with peers (Srite and Karahanna, 2006). The influence of the institute of family is very strong in the Saudi society and culture, which reflects in the business sector, too, where a big percentage of organisations are family owned and managed by friends and family (Idris, 2007). Nepotism resulting from tribal values has a clear impact on the business organisations in the country where top managers are often related to the owner of the business either by blood or tribal name (Pillai *et al.*, 1999). However, this has also resulted in a corporate culture where employees do not expect to be given liberties or made part of the decision making process (Bhuian *et al.*, 2000).

It is common practice for owners and top managers to make all the decisions in an organisation (Yavas, 1997), which are rarely challenged by middle management or low-level employees (Yavas, 1997). Given this culture, the introduction of innovations such as ERP requires organisation-wide changes. These require tremendous effort and pose challenges in terms of convincing the owners and top managers to change and implement these systems successfully (Hossain *et al.,* 2011).

Given the above, Saudi Arabia's national culture, which is deemed, needs to be considered when adopting implementing innovation and new technology. Agourram's (2009) study which explored how managers in a Saudi public university perceived and defined IS, show how society and culture deeply influence the IS related decisions in the country's organisations. This suggests that the challenges that managers of the implementation of ERP systems within developing countries such as Saudi Arabia can vary significantly (Forster *et al.,* 2009; Lenart, 2011). Table 4.1 provides a summary of the cultural characteristics of Saudi Arabia.

Table 4.1: Summary of the cultural characteristics of Saudi Arabia

Characteristics	Definition/attributes	Selected sources
High power distance	Saudi business owners and managers do not want to empower employees	Hofstede, 1983; Bochner and Hesketh, 1994; Al-Gahtani *et al.*, 2007
High uncertainty avoidance	Saudi people have low tolerance for unexpected events and managers solve conflicts in authoritarian style	Hofstede, 1983; Bochner and Hesketh, 1994; Al-Gahtani *et al.*, 2007
High level of collectivism and low level of individualism	They prefer working in groups and prefer family and friends to manage these groups	Hofstede, 1983; Bochner and Hesketh, 1994; Al-Gahtani *et al.*, 2007
More feminine than masculine	Emphasis on concern for others and friendly relationships among people.	Bjerke and Al-Meer, 1993; Al-Gahtani, 2007
Firmly connected with one another by means of family bonds and responsibilities	Family bonds and obligations come first and affect individuals' discussions as they need to be aligned with family.	Baker *et al.*, 2010; Aldraehim, 2013
Limited occupational and geographic activity	People prefer to work close to home and family.	Baker *et al.*, 2010
Females make a small minority in the country's workforce	Majority of the workforce are men.	Al-Gahtani, 2004
Professional median age is lower than in developed states	Professionals are younger than others in developed countries.	Al-Gahtani, 2004
A large number of businesses are family owned and managed by members of the family or friends	Preference to work with relatives and acquaintances.	Idris, 2007
Tribal values influence management heavily	The manager is the father figure for the organisation.	Pillai *et al.*, 1999
Top managers exclusively make business decisions	Employees and middle management have less involvement in decisions that have a major impact in organisations. Employees expect to be directed and told what to do by their managers.	Yavas, 1997; Bhuian *et al.*, 2000

Source: The researcher

4.7 The ERP Implementation Context

It is quite important to acknowledge that the government of Saudi Arabia recognises the adoption of IT as a key role player in economic success of the country and is supporting mega projects of telecom and technology infrastructure across the Saudi landscape. It has become the biggest ICT market in the whole MENA region. SAGIA - the Saudi Arabian General Investment Authority - announced to invest over $64 billion in the sector (Information Office in the Royal Embassy of Saudi Arabia in USA, 2008). However, this commitment for development of IT and technology, in general, is met with some challenges on political, economic, social, and cultural levels (Al-Turki and Tang, 1998; Al-Sudairy and Tang, 2000). Al-Turki and Tang (1998) claim that there many issues associated with the adoption and use of IT, including the absence or weakness of top management support, the constraints of IT budgets, the shortages of qualified staff and the lack of high-quality training for the workforce.

ERPs have been introduced in many organisations in the KSA in recent years in both public and private sectors. Some organisations have gone on to implement packaged software systems, such as ORACLE, while some others have invested in developing local ERPs, such as MADAR (Althonayan, 2013). However, ERP implementation remains a highly critical issue in Saudi Arabia (Bazhair and Sandhu, 2015), as the acceptance of technology in general is one of the main issues that has to be addressed (Kwahk and Lee, 2008; Santamaria-Sanchez *et al.*, 2010). ERP implementation in Saudi Arabia is often faced with resistance, as the users feel that changes in the power structure can lead to significant problems in terms of changes in the output of the organisation (Bazhair and Sandhu, 2015; Chen *et al.*, 2008; Vandaie, 2008). Saudi organisations face a long list of challenges in implementing ERPs, including but not limited to cultural and social barriers, insufficient IT legislation, lack of IT user skills, limited awareness of IT, and insecure infrastructure (Al-Shehry *et al.*, 2006). Hossein *et al.* (2011) conducted a series of six organisational case studies where they studied ERP implementation and learned that governance model of the organisation and ownership type affect ERP success and are found to impede successful ERP implementation. Scope was another pain area in the study's findings of where Saudi organisations are weak in adopting ERP systems. Managers were also found to be concerned they would eventually lose control of their employees given an effective ERP is adopted by the organisation. Table 4.2 summarises the main factors identified by the literature review that can affect the adoption and use of ERP in Saudi Arabia. These will be investigated and checked in the empirical study.

Table 4.2: Main factors influencing ERP implementation in Saudi Arabia

Factors	Selected sources
Insecure infrastructure	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011
The constraints of IT budgets	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011
Lack of policy and judiciary requirements regarding IT	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011
Interference during vendor selection	Hossain *et al.*, 2011
Lack of understanding of which modules to implement	Hossain *et al.*, 2011
Employees were not involved in ERP system implementation decisions	Hossain *et al.*, 2011
Reluctance to change business processes and rules	Hossain *et al.*, 2011
Poor management of the scope of implementation	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011
Employees did not receive adequate training	(Hossain *et al.* 2011
Reluctance to delegate authority to middle- and low-level employees	Hossain *et al.*, 2011; Bazhair and Sandhu, 2015
Employees did not have the authority to execute business processes	Hossain *et al.*, 2011
Insufficient IT skills among the users	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011
Social and cultural barriers	Al-Shehry *et al.*, 2006; Al-Turki and Tang, 1998; Hossain *et al.*, 2011

Source: The researcher

4.8 Saudi Arabia as a Context for This Study

Despite the fact that the MENA region has been undergoing difficult and turbulent times since 2011, Saudi Arabia has remained secure, and foreign investors still consider it an attractive country for investment (U.S. Department of State, 2015). Saudi Arabia has been chosen as a context for our study for several reasons. First, Saudi Arabia is one of the largest emerging economies in the world (G20) and is the largest economy in the MENA region. Its economic strength stems not only from being the largest oil producer in the world, but also from its currency, the Saudi Riyal (SAR), which is one of the most stable national currencies. Second, the county is also among the most rapidly growing economies globally, with per-capita income rising from US$ 60,357 to US$ 90,946 for the 2009-2014 period. Third, Saudi Arabia is considered as the biggest market for ICT in the MENA region. The Saudi ICT sector represents approximately 55% of the total IT in the regional market and ICT and ERP adoption have also been increasing rapidly in both private and public sectors. Fourth, Saudi Arabia has a unique culture where females represent a smaller percentage of the workforce, and the median age of professional workers might be a good enabler for organisational learning and learning in general (Al-Gahtani, 2004). Fifth, Saudi Arabia has been placed as one of the top countries in the MENA region in a number of global ranking indicators. In addition, it also outranks the majority of the world's nations both economically and financially. All of these make it an ideal context for this study.

4.9 Summary

This chapter investigated and discussed relevant aspects of Saudi Arabia such as the political, economic, global economic and innovative aspects of the country, as well as the financial and performance indicators and ERP implementation context. The aim of this chapter was to provide an understanding of the nature of any existing problems that may prevent Saudi organisations from successfully implementing ERP systems. In previous chapters, all possible issues that might affect the adoption of ERP systems have been studied, although with the rapid adoption of ERP systems, there is no universal model for implementing these systems in all countries. There is no one solution used in one country that might fit another country. This chapter has identified the political, economic, innovative and cultural factors and characteristics that may influence ERP implementation in Saudi Arabia. It has, above all, identified the main challenges that organisation in the KSA have been encountering when adopting and implementing innovations such as ERP.

Chapter Five: Methodology

5.1 Overview

This chapter focuses on reviewing and examining the relevance for the objective of this research of the existing philosophical positions and methodologies used in the field of information systems (IS), and in particular, the enterprise resource planning systems' (ERP) implementation. This review is aimed at analysing prevailing paradigms and methodologies within the field of enquiry, in order to determine their suitability for the study, which is investigating ERP implementation as an innovation in Saudi Arabia.

5.2 Information Systems: A Social and Business Research

The goal of social sciences is to undertake studies about human society and human behaviour; because of this, the subject is different in character from natural sciences. In social sciences, there is a necessity to consider questions of ontology and epistemology, which pertain to the nature of being, and the nature of knowing (Comte, 1973; Bhaskar, 1989). According to Sekaran (2000: p. 5), business research is defined as a systematic, critical, organised and objective scientific analysis or inquiry into a problem that is specifically undertaken, in order to discover its interpretation or solution. While information systems research, on the other hand, is considered to be social science research, it is far more than the creation or development of computer systems.

Information systems is concerned with a number of issues, including technology, psychology, sociology, economics and the integration of technology in organisations.

As ERP research builds more on general IS research, it is beneficial to examine the large body of knowledge accumulated in the research filed of information systems over the past two decades. Lately, the research emphasis on information systems has shifted from focusing on the technological facets of the systems, to one of a more social form, focusing on managerial issues (Myers, 2013) hence the decision to build this research on the field of innovation management.

The advancement of social research introduced some changes to the way IS researchers undergo their exploration and the way they read their data. Paul (2007: p. 194) defines IS as "what emerges from the usage and adaptation of the IT and the formal and informal process by all its users". Informal processes are the inventions and creations of human elements, in order to ensure that there will be benefits and valuable work is achieved. Formal processes describe pre-determined use with respect to the decisions about the most relevant IT available for use. These processes are in a constant state of change, following the changing world around them.

Implementing systems, such as ERP systems, represent complex phenomena, as they include not only technology, but also people, process, society and a continually changing business environment. Some researchers (e.g. Orlikowski and Baroundi, 1991; Steinmetz, 2005; Hirschheim, 1985) find that the root of information systems overlaps with different fields of study, such as social sciences, computer science, and business and management studies. When compared to other management and organisational research, IS research contains the same complexity and real world challenges as others (Mingers, 2001; Galliers, 1993).

Reviewing the philosophy underpinning the research of the social sciences is considered a vital aspect of the research process. Researchers can be enlightened and guided by these philosophies when conducting their own research. It can also enhance and enrich their research skills, and improve their confidence regarding use of the appropriate methodology that is best suited to their research preferences.

5.3 Research Philosophy

According to James and Vinnicombe (2002), it is important to consider the perceptions, assumptions and beliefs of the researcher, in order to ensure that any researcher biases or perspectives are transparent and considered in the light of the research methodology, objectives and output. These influences may be classified as the ontological and epistemological paradigms, or more broadly as the research philosophy. A consideration of ontology is important in understanding how we position our version of reality, and what constitutes knowledge within that reality.

Management researchers contend that ontology and epistemology should be articulated in the research plan in order to provide the background for coherence and consistency (Hallebone and Priest, 2005). The debate among social sciences researchers on the ontological and epistemological basis of social sciences has endured for many years. Yet, still, no agreement has been reached upon the value of ontology and epistemology.

Ontology is the theory or the study of existence (being). It is concerned with the nature of reality; therefore, it explains the assumptions that we make about the way in which the world operates and the commitment to particular views (Saunders *et al.,* 2011). For example, ontological assumptions regarding the conduct of inquiry within a paradigm might explicitly characterise the nature of reality (Khazanchi and Munkvold, 2003). It is the study of our view of the world and the nature of reality, which Crotty (2011: p. 10) calls the "science or study of being". The two main facets of ontology that are likely to be acknowledged as producing valid knowledge among business and management are: 1) objectivism, which represents the position that social bodies exist in reality external to the social actors concerned with their existence; and 2) subjectivism, which holds that social phenomena are created from the perceptions and consequent actions of these social actors concerned with their existence (Saunders *et al.,* 2011).

Epistemology, for Saunders *et al.* (2011), it describes acceptable knowledge in a field of study. Maynard (1994: p. 10) views epistemology in the context of the social researcher: "Epistemology is concerned with providing a philosophical grounding to decide what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate". It is often considered that the relationship between epistemology and ontology is close and interdependent, where each informs and depends on the other (Hatch and Cunliffe, 2013). This, however, explains why these two philosophical terms are often conceptually merged. Hirschheim (1985: p. 13) states "IS epistemology draws heavily from the social sciences because information systems are, fundamentally, social rather than technical systems".

5.4 Research Paradigms in IS Research

The research philosophy or paradigm shapes the way people study their world. It concerns how they view the world, interpret it and choose to accept what is valid and important in what they see. Furthermore, it proposes how research can and should be conducted, who should conduct the research, and to what extent the researcher's involvement or detachment is present in the research (Rubin and Rubin, 2011). The word "paradigm" was used by Collies and Hussey (2003) to describe the scientific practices founded on the assumptions of individuals, regarding humanity and the nature of knowledge. Saunders *et al.* (2011: p. 118) define a paradigm as "a way of examining social phenomena, from which particular understandings of these phenomena can be gained and explanations attempted". They assert that there are diverse views regarding the nature of our world (ontology), and how the knowledge about it is acquired (epistemology), from different philosophical paradigms.

Mingers (2001) states that if there is enough justification, a sequential movement between paradigms is permissible. Therefore, incommensurability, as popularised by Kuhn (1970), is a phenomenon that describes conflicting observational, methodological, procedural and paradigmatic approaches to research. It is an absence of common measures, and the availability of contrasting conceptual directions.

Burrell and Morgan's (2017, 1979) model was horizontally divided based on the purpose of the study. They claim that it is unlikely for there to be a study crossing the horizontal border, while it is common practice for researchers to cross the vertical border. This suggests an overall relevance of the research aim in the adoption of the methodological position.

Research on social sciences is mainly divided into two noticeably different camps: positivism and interpretivism (McNeill, 1990; Saunders *et al.,* 2000). While IS research, as a part of the social sciences (Boland and Hirschheim, 1992), is not rooted in a single theoretical perspective, there are a number of philosophical stances that can be used, according to the phenomenon under research (Orlikowski and Baroudi, 1991). IS research is considered more social than technical

; it has been seen from different perspectives, for instance, from a positivist perspective (Evered and Louis, 1981; Orlikowski and Baroudi, 1991; Milward and Provan, 1998; Lee, 1991; Stone, 1990; Coghlan, 2004; Alavi and Carlson, 1992), an interpretive perspective (Klein and Lyytinen, 1985; Lee, 1999; Rose, 2002), critical realism (Hjorland, 1998; Dobson, 2002), and a pragmatism perspective (Agerfalk, 2010; Goldkuhl, 2008). Reviewing 155 IS studies conducted from 1983 to 1988, Orlikowski and Baroudi (1991) discovered that almost 97% used the positivist perspective, while only 3% employed the interpretive perspective.

As with any field of study, there is an ongoing debate as to which methodological assumption leads to a more sound manifestation of the truth. Kuhn (1970) notes that paradigms describe a researcher's own composition of value judgements, norms, standards, frames of reference, perspectives, ideologies, theories, concepts, and genres, among other things. Furthermore, Kuhn (1970) argues that, even though paradigms are fundamentally different from one another, in terms of a paradigm's assumptions, commitment to a single paradigm is a must. On the other hand, Mingers (2001) suggests that if there is sufficient justification, a sequential movement between different paradigms is permissible.

A number of taxonomies have been presented to classify different types of IS research, in prior research in the field of IS. Orlikowski and Baroudi (1991) classified IS research paradigms as positivist, interpretive critical research, and pragmatic based on ontological and epistemological assumptions.

The research paradigm informs the research and the role of the researcher in conducting the study, and ultimately influences the findings and applicability of those research findings. Dube and Pare (2003) argue that a research paradigm can also determine the standards and quality by which a study can be evaluated. These philosophical perspectives underline the way in which data is collected and analysed. Therefore, it is vital to review different paradigms before proposing a research framework (Creswell, 2003). Appendix 3 presents an overview of the major IS research paradigms.

Positivism: Positivism was defined by Denscombe (2001: p. 229) as "an approach to social research, which seeks to apply the models of research of natural science to investigations of the social world". Within this approach, it is assumed that, similarly to the natural world, the social world comprises obvious causes, consequences, regularities and patterns (Denscombe, 2001). Collis and Hussey (2003) believe that positivism is established on the theory that human behaviour studies should be conducted in the same manner as natural science studies. Therefore, positivism attempts to place social research in a realm that is similar to scientific research.

The positivists' view of the world is that the world can be studied objectively. They also assume that since reality is objective, it can be quantified and become independent of the researcher and the researcher's tools. Furthermore, positivists tend to test theory in order to increase the predictive understanding of the phenomena (Myers, 2013). Remeniy *et al.* (1998) view the essential assumption in positivist research, the sense that the researcher is independent and does not affect the subject of the research, nor is he/she affected by it in turn.

On the same note, Oates (2006) asserts ontologically the basic positivist assumption: the researcher is expected to be detached from the objects of the research, and epistemologically, it is possible to collect data objectively. According to Gill and Johnson (1997), in positivist research the main emphasis is the structured methodology to facilitate reproduction and quantifiable observation, which by default leads to statistical analysis.

Yet some authors criticise positivism (Remeniy *et al.,* 1998; Collis and Hussey, 2003; Mashat, 2005). There was a dispute upon the founding of a relationship amongst variables that depended on the definition of a variable. The authors explained that treating the subjects as beings that are disconnected from the social environment is not possible, and that they will not be understood unless their perceptions of self-activities are examined (Remeniy *et al.,* 1998; Mashat, 2005). Positivism was also criticised by Collis and Hussey (2003) regarding the objectivity of the researchers. It is contended that researchers introduce values and interests of their own during the investigation. A noticeable number of practitioners find traditional IS research to be irrelevant and unreadable (Susman and Evered, 1978; Coghlan, 2004), as the positivism paradigm may not address all the needs or provide solutions that can be practically applied (Galliers, 1993).

Interpretivism: Interpretivism is a commonly regarded research paradigm within the community of IS scholars (Stahl, 2014). It was developed as a response to the prevailing positivist tradition, especially in information systems and more generally in the social sciences. Moreover, it rejects the view that complex social phenomena, such as those related to information systems, can be objectively and broadly described by referring to an observer-independent reality (Stahl, 2014). The aim of interpretivists can be presented, according to Trauth and Jessup (2000: p. 54), as "[piecing] together people's words, observations and documents into a coherent picture expressed through the voices of the participants".

The motivation of interpretive investigations is understanding the meaning that individuals attribute to their environment, including organisational structures, technological artefacts and their relationship (Schultze and Leidner, 2002). Interpretivism assumes that individuals, when interacting with their environment, create their own subjective reality (Orlikowski and Baroudi, 1991). Therefore, it is of high importance for researchers to appreciate the differences between humans in their role as social actors (Saunders *et al.,* 2011). The term "social actors" suggests that "as humans, we play a part on the stage of human life" (Saunders *et al.,* 2011: p. 116), just like actors who interpret things their own way and then act accordingly. Walsham (1995: p. 79) stated that "interpretivists are not saying ‘that they are reporting facts’; instead, they are reporting their interpretations of other people’s interpretations".

Interpretivists assume that reality is shaped within the social context, for example, with the use of language, consciousness, shared meanings, documents and other artefacts (Klein and Myers, 1999). Interpretive research focuses more on the complexity of the human sense-making of situations that occur (Kaplan and Maxwell, 2005). The interpretive epistemology is that reality is very much a situational social construct, where new knowledge is created if there is a good understanding of the complex environment around a specific situation, at a particular time. The aim is not to acquire a universal truth, but rather to gain a unique understanding of the complex human processes used in various situations (Baskerville and Wood-Harper, 1996; Orlikowski and Baroudi, 1991).

The characteristics of interpretive research, according to Oates (2006), include: 1) multiple subjective realities, 2) dynamic socially constructed meaning, 3) researcher reflexivity, 4) study of people in their natural settings, and 5) multiple interpretations. Guba and Lincoln (1994) outline the main factors that can be used to examine the quality of interpretive research: 1) trustworthiness, 2) conformability, 3) dependability, 4) credibility and 5) transferability. These factors, however, are a result of the researcher’s own perceptions and opinions about the subject.

The study of information systems research can follow any of the three approaches: positivist, interpretive or critical (Prybutok *et al.*, 1997). The information systems epistemology depends on social sciences, since IS is essentially more social than technical (Boland and Hirschheim, 1992). In the IS research, the aim of the interpretive method is to understand the context of the IS and the process that influences it (Klein and Myers, 1999). The method for such interpretative investigation is often an in-depth case study (Walsham, 1995).

Critical Realism: Realism, for Saunders *et al.* (2011: p. 114), is "another philosophical position which relates to scientific enquiry". The essence of realism is that "what the senses show us as reality is the truth: that objects have an existence independent of the human mind". They distinguish between the two epistemological positions of realism. **First**, direct realism, which is an "epistemological position that what you see is what you get: what we experience through our senses portrays the world accurately", suggesting that the world is relatively unchanging, and in the context of business operates at one level. **Secondly**, critical realism, in which "what we experience are sensations, the images of the things in the real world, not the things directly". Critical realists recognise the importance of multi-level study (e.g. levels such as the individual, the group and the organisation). Each of these levels has the ability to change the researcher's understanding of what is being studied (Saunders *et al.,* 2011: p. 114). Furthermore, they argue that for a critical realist, the social world is constantly changing. Sekaran and Bougie (2013) claim that critical realism is considered as an intermediary viewpoint between the two opposing views on research and on how the research should be conducted. Critical realism is the mixture of belief in an external reality, while rejecting the claim that external reality can be objectively measured and observation will always be subject to interpretation. Although it has been adopted and endorsed as an epistemological stance for information systems in a number of IS studies (Scott, 2007; Dobson, 2002), Carlsson (2005) claims that it is largely absent from IS research.

Pragmatism: The pragmatist philosophy has influenced IS research to a great extent (Baskerville and Myers, 2004), although the paradigmatic foundations have not been fully explicated (Goldkuhl, 2012). A number of researchers have recognised the significance of pragmatism to information systems (e.g. Agerfalk, 2010; Baskerville and

Myers, 2004). Goldkuhl (2012) stated that "pragmatism is concerned with action and change and the interplay between knowledge and action. This makes it appropriate as a basis for research approaches intervening into the world and not merely observing the world." Venkatesh *et al.* (2013) argue that pragmatism considers practical consequences and real effects to be the vital components of meaning and truth, since it rejects forced choices between existing paradigms with regard to logic, ontology and epistemology.

According to Goles and Hirshheim (2000), pragmatism may adopt a pluralist position, which means that researchers may choose whatever methods are appropriate for the study. Saunders *et al.* (2011: p. 109) confirm this by stating that "the most important determinant of the epistemology, ontology and axiology you adopt is the research question – one may be more appropriate than the other for answering particular questions". Therefore, it is possible to combine a pragmatist study with interpretive methods and positive thinking. Evered and Louis (1981: p. 393) argue that the use of a single mode of enquiry is hindering research experience. They suggest that "Our ability to grasp the breadth, depth, and richness of organisational life is hampered by allegiance to a single mode of inquiry." In addition, Orlikowski and Baroudi (1991: p. 7) state their concerns about the use of a single approach:

> *An exclusive view is always only a partial view, and the dominance of positivism, by not acknowledging the legitimacy of other research traditions, has limited what aspects of information systems phenomena we have studied, and how we have studied them. This has implications not only for the development of theory and our understanding of information systems phenomena, but also for the practice of information systems work.*

The Choice of the Interpretive Paradigm

Kuhn (1970) argues that even though paradigms are fundamentally different from one another, in terms of the paradigm's assumptions, commitment to one single paradigm is necessary. Collis and Hussey (2009) claim that the choice of adopting a certain paradigm for a specific research is determined by both the prevailing paradigm in the research area, and by the nature of the research problem. Therefore, the interpretivist point of view is considered in this research for a number of reasons.

First, the research proposes to investigate the main factors for the effective implementation of ERP as a complex innovation at an organisational level in Saudi Arabia. In addition, the research aims to contribute to a greater understanding of the effectiveness of implementation of innovation in developing countries. It aims to achieve this objective, and gain an in-depth understanding of the key factors affecting the process of implementation of ERP at the organisational level (i.e. the organisation as the unit of analysis), in Saudi Arabia, as a developing country. Moreover, this study aims to increase the understanding of ERP implementation, and examine the phenomena in a particular context, from the participants' perspective. ERP systems are understood in this context as socially defined, and consequently relevant only in relation to the people engaging with them (Orlikowski, 2009).

Second, the choice of this approach is essentially motivated by acknowledging that "Information system epistemology draws heavily from the social sciences because information systems are, fundamentally, social rather than technical systems" (Hirschheim, 1985: p. 13). In addition, given the uncertain and complicated nature of innovations such as ERP, the adoption of such systems can be better understood by examining the interpretations of pertinent community members (Wolfe, 1994; Boonstra, 2003).

Third, interpretive studies in the information systems field are concerned with understanding the social context of IS. Madon (1992: p. 21) stated that "… the interpretive nature of the object studied means that knowledge can only be acquired by understanding and interpreting the process of interaction between people in a particular social setting". Interpretive studies aim to explore and explain how all aspects are related and interdependent in a particular social setting (Oates, 2006). Furthermore, prior IS studies discovered that the interpretive paradigm is more effective in appreciating the richness of a social context, compared to the positivist paradigm (Orlikowski and Baroudi, 1991).

Fourth, most of the previous studies on ERP implementation adopted a positivist paradigm. Some researchers (e.g. Walsham, 1993) argue that this approach is limited in providing deep knowledge about a phenomenon. An interpretive approach is capable of revealing deeper knowledge, by exploring greater meaning through an examination of the perceptions of human actors.

Fifth, this study is concerned with a practical perspective on the ERP implementation, as a compels innovation. Analysing practice is crucial to this research work; therefore, the research methods are contextually dependent. The interpretive approach increases understanding of the implications of IS implementation in organisations (Orlikowski, 1991).

Sixth, the literature review and analysis discussed in this study indicates that there are many organisational, operational, managerial and technical matters related to the introduction of ERP systems and their impact on the whole organisation. These impacts appear to be multiple, complex and interrelated. Thus, the nature of ERP systems implementation cannot be detached from the organisational, technical and cultural context. As a result, there is a necessity for a research approach that allows a deeper understanding of the factors which affect the implementation of ERP implementation as well as the relationships and roles of stakeholders in a context of a developing country which remains not sufficiently explored.

For these reasons, an interpretive approach is considered to be the most appropriate for this study. Table 5.1 provides a compression of positivism and interpretivism.

Table 5.1: Comparison of positivism and interpretivism

Axioms/Issues	Positivism	Interpretivism
The nature of reality	Reality is single, tangible and able to be separated.	Realities are multiple, constructed and holistic.
The relationship of the knower to the known	Researcher and researched knower to the known are independent.	Researcher and researched are interactive, inseparable.

The possibility of generalisation	Time- and context-free, generalisations (nomothetic statements) are possible.	Only time- and context-bound hypotheses (idiographic statements) are possible.
The possibility of causal linkages	There are real causes, temporally precedent to, or simultaneous with, their effects.	All entities are in a state of mutual simultaneous shaping, not easy to distinguish causes from effects.
The role of values bias	Inquiry is value- and bias-free.	Inquiry is value bound and subject to bias.
Relation to theories	Theory and hypothesis testing. Preconceived law such as scientific theories. Testing and proving theories comprising variables and hypotheses. Realistic about existing theory.	Theory generation No preconceived theories. Knowledge of reality is gained only through social constructions.
Study type	Exploratory study	Exploratory study
Meaning	One single meaning	Likelihood of many meanings
Researcher role	Researchers outside the study. Researcher takes the role of an observer. Attempts to increase the predictive understanding of the phenomena.	Researchers part of the research. Signifies the complexity of human sense as situation changes. Researcher participates in the empirical study.
Word uses	Operationalisation of words	Interpretation of words
Uses	Usual for laboratory experiments – forecasting – simulation.	Usual for subjective review – debates – descriptive interpretations.
Connection of theory and data	Deduction	Induction
Research process	Objectivity	Subjectivity
Inference from data	Generality	Context
Methods	Quantitative data and analysis	Qualitative data and analysis
Tools	Survey	Single case study, semi-structured observation and secondary data
Sampling/population	Convenience sampling	interviews
Analysis	Data analysis (SPSS)	Data analysis, qualitative data analysis (QDA)

Source: The researcher

5.5 Research Methods

This section defines the two extreme methodological approaches to research, and the need to examine both quantitative and qualitative methods as valid approaches to IS research. It also describes and justifies the use of a mixed-methods approach to provide a comprehensive understanding of the study and its context.

Quantitative: A very significant advantage of quantitative research is the necessity that the sample employed in the investigation reflects the qualities of the audience under study. The results generated from the study link to the entire population, hence the conclusions derived could be relevant for the whole population (Sarantakos, 1998).

This feature of social sciences is called representativeness. In addition to the issue of representation, quantitative methodologies have the benefit of employing standardised measurements. This claim was backed by Patton (1990: p. 14), when he stated that quantitative methods involve the use of uniform measurements, and therefore, the differing perspectives and experiences of people can appropriately fit into a restricted quantity of set response categories on which the numbers are allotted.

Creswell (2009) defines quantitative research as a "means for testing objective theories by examining the relationship among variables, which in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures", arguing that quantitative researchers make "assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalise and replicate the findings". Quantitative research fundamentally includes the collection, analysis, interpretation and illustration of numerical data (Teddlie and Tashakkori, 2009).

While the testing and validating of well-known theories have an explanatory role, attitudes and awareness are inaccessible to direct observation; it is the inferred replies that are measurable (Ajzen, 2005). Quantitative research allows research questions to be tested through selected samples, and generalisation can then be made accordingly. Significantly, it should be noted that it is normal for the terms "positivist" and "quantitative" to be used interchangeably in relation to research. It is also a preferred method of research among IS researchers (Orlikowski and Baroudi, 1991; Milward and Provan, 1998; Lee, 1991; Stone, 1990), as it provides more explanation of variance in statistical terms than qualitative methods (Kaplan and Duchon, 1988).

Qualitative: According to Baskerville and Wood-Harper (1996,) qualitative research methods assist social science researchers in studying social and cultural phenomena. Qualitative research examines the natural environment in order to understand phenomena, in the context of the meanings people attach to them (Denzin and Lincoln, 2005). In Denzin and Lincoln's (2005: p. 3) words:

> *Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.*

Qualitative techniques emerge from phenomenology and interpretative paradigms that emphasise a constructive approach, which assumes no clear-cut objectivity or reality (Salimi, 2005). Qualitative methods permit researchers to analyse selected issues in depth, without being limited by pre-determined categories of analysis.

Silverman (1998, 2015) suggests that the essential strength of qualitative research is that it provides focus on actual practices on site, examining how organisations are normally enacted, which allows the researcher to better understand the meanings people place on their experiences, thoughts, perceptions and assumptions, in the context of their surrounding social and cultural environment in the KSA.

Social and organisational life is perceived as emerging from the shared meaning and creativity of individuals. Qualitative research focuses on more detailed cases to increase in-depth understanding of the cases, where the presence of few entities (e.g. people, organisations and systems) is more suitable to the in-depth study, rather than studying many entities more selectively (Myers *et al.*, 1997). A number of researchers have outlined the main advantages and disadvantages of both qualitative and quantitative research methods (Table 5.2).

Table 5.2: Main advantages and disadvantages of qualitative and quantitative methods

	Quantitative research	**Qualitative research**
Advantages	• Allows accurate measurement • Structured methods • Covers wide range of situations • Covers large sample of population • Largely used in IS studies • Statistical analysis • Results can be generalised • Economical and can be fast	• Enhance description and theory building • Describes experiences and feelings • Allows in-depth understanding • Holistic and humanistic • Exclusion of meaning and purpose • Very flexible methods • Value placed on participants' views • Inductive data analysis • Subjective dimensions are explored
Disadvantages	• Use of inflexible methods • Deterministic character • Disregards some important factors • Misses subjective aspects of human existence • Assumption of an objective truth • Generation of incomplete understanding • Inapplicable to some immeasurable phenomena • Not very helpful in generating theories	• Lack of hard data or clear measuring • Subjective, "non-scientific" • Deep researcher involvement increases risk of bias • Small samples • Generalisation is limited to similar contexts and factors • Analysis and interpretation of data may be more difficult • Policymakers may give low credibility to results from qualitative approach

Derived from Kaplan and Duchon (1988), Guba and Lincoln (1994), Amaratunga *et al.* (2002), Denzin and Lincoln (2005) and Creswell (2009).

Mixed Method: While it is common for researchers to follow either quantitative or qualitative research methods, others may consider both methods at the same time; this is acceptable and becoming more common. With that, it should be noted that there is no one way or "right" way to mix these methods. Johnson and Onwuegbuzie (2004: p. 17-18) state:

> *Mixed methods research is formally defined here as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study. Mixed methods research also is an attempt to legitimate the use of multiple approaches in answering research questions, rather than restricting or constraining researchers' choices (i.e. it rejects dogmatism). It is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research.*

Therefore, a mixed-methods research design allows researchers to collect and analyse their research data qualitatively and quantitatively in one (or more than one) study, in order to better comprehend a research problem (Creswell and Clark, 2011).

The use of the mixed-methods approach presents some challenges, which should be acknowledged. Mingers (2001) summarises three essential challenges for the researcher when conducting a mixed-methods study. First, these methods reflect two contradicting philosophies, ontologically and epistemologically, signifying competing "truths" about the world and how reality exists. Second, IS research has traditionally held that positivism is only valid in a scientific approach (Lee, 1991). The third challenge is the researcher's ability to move from one method to another while taking into consideration the unique characteristics of each approach. There are some other practical challenges in using the mixed-methods approach; for instance, the researcher should have a satisfactory proficiency in using analysis software, such as NVivo, MAXQDA and SPSS software. However, the pragmatic approach was developed as a means to bring the two methods together, and ended the paradigm conflict by emphasising the need to place greater focus on the research questions, and whether they can help the researcher regarding the reality of what is being examined and what needs to be known (Hanson, 2008).

Justifications for using Qualitative Research

Conboy *et al.* (2012) argue that qualitative approaches are often associated with an interpretivist stance. "Interpretivism is the lens most frequently influencing the choice of qualitative methods," says Trauth (2001, p.7). Incidentally, Sarker *et al.* (2013) studied qualitative research published during 12 years (2001-2012) in *Journal of the Association for Information Systems (JAIS)*, *Journal of Management Information Systems (JMIS)*, *Information Systems Research (ISR),* and *MIS Quarterly (MISQ)*. Over the period under analysis, the researchers found a steady rise in the number of studies published each year. This was also confirmed by Goldkuhl (2012), who stated that the importance of qualitative research into information systems has increased over the years, attributing this increase of interest to the growing number of researchers finding difficulties in reducing the complex social and technical phenomena in the information systems field to quantitative figures.

Qualitative methodologies can help in better understanding the underlying unstructured features of IS software (Von Hellens *et al.*, 2005). This observation means qualitative studies can help discover new reasons why ERPs have been failing under certain factors, which may lead to discovering robust solutions to the problems significantly influencing success of ERPs but have been ignored in quantitative studies (Von Hellens *et al.*, 2005). Furthermore, qualitative studies can be a rich source of significant results pertaining to the many phenomena related to IS and empirically study these problems to discover their solutions by means of inductive data collection methods, including, but not limited to, archival material, interventions, design, observations, and interviews (Conboy *et al.*, 2012).

The choice of research study relies on the kind of research to be completed, as the most suitable research method for any subject is guided by both the nature of the examination and the researcher. The decision to adopt qualitative research is based on the need to align theoretical and philosophical assumptions, to maximise the ability to understand the rising viewpoints in such dynamic and complex social phenomena, and to achieve the required rich information. The considerations for this choice are discussed below, to confirm and demonstrate the rationality and consistency between theoretical and philosophical underpinnings.

First, in the current study, qualitative methodology is employed with the aim to create a metaphorical bridge between the various theories related to IS and philosophical opinions found in the literature on the same subject. With this kind of an ideation process in a study, which has interpretive inclinations, where the context of the research problem influences the results and is focused on understanding the way certain ideas work, choosing a qualitative methodology to conduct the study becomes the appropriate choice. The philosophical view used in this study is to adequately understand *knowledge of reality* using social constructs (Klein and Myers, 1999). Thus, qualitative methods suit this study and aims to answer the main research questions. This will therefore help gain a better understanding of the main issues and challenges associated with the implementation of ERP in the KSA. It will also enable the research to identify the main factors for the successful implementation of this type of complex innovation.

With the use of qualitative methods a researcher implies that social outcomes, such as the negative perspectives of employees in an organisation undergoing ERP implementation with regard to the IS project, may be a result of social constructs, such as negative interactions rather than something objective (Onwuegbuzie, 2004).

Second, this research study proposes to cover ERP systems from multiple perspectives. Technical, organisational and personal viewpoints are all taken into consideration. Furthermore, the current research focuses on the organisational, technical and personal perspectives, as qualitative methods are an effective means to study various social issues. In order to study both the implementation of ERP systems in their natural settings and the interpretation of the researcher, it is more effective to use this approach (Myers and Avison, 2002).

Third, the research examines in-details complexities and processes of a lesser known phenomenon adopted in a context such as the KSA which is insufficiently explored. Therefore, to better understand the process of an ERP system's failure (or success) and the related dynamics, this study employed a qualitative methodology. ERPs are complex in their own right, and their implementation, whether they succeed or fail, heavily depends essentially on the organisational context (Sedmak and Longhurst, 2010, hence the organisation being the unit of analysis for this research. Given that the aim of this study is to generate in-depth understanding of ERP implementation, there was a shortage of empirical qualitative research. Little research has examined learning and knowledge sharing in the context of ERP implementation, as an innovation in Saudi Arabia. Consequently, qualitative research is considered the most suitable choice for such an inquiry, because this research intends to contribute to filling this epistemological gap in inter-organisational relations studies.

Fourth, the qualitative approach provides contextual details to the study (Bryman, 2004). According to Silverman (1997) and Mason (2017), the qualitative approach is more suitable when studying the details and insightful interpretations of specific phenomena, such as ERP, as a complex system of innovation, since the aim of this research is to study issues in their natural settings, and attempt to understand phenomena in terms of the meanings that people ascribe to them (Silverman, 2013, 2015). It is clear from the objectives of this study that the issues under investigation are complex and subjective, and considerable contextual data is required to provide more understanding. Therefore, the qualitative method is considered to be the most appropriate approach for this study.

5.6 Research Approaches

The research approach should be considered in any research that either relies on, or develops, one or more theories. Many types of research are classified according to the logic of the research (e.g. deductive, inductive) (Collis and Hussey, 2009), the purpose of the research (i.e. exploratory, descriptive, analytical, or explanatory or predictive)

(McNabb, 2002; Collis and Hussey, 2009; Yin, 2012, 2009, 1984), and the process of the research (qualitative, quantitative or mixed methods) (Collis and Hussey, 2009).

Commonly, there are two main approaches to research: inductive and deductive (Blaikie, 2007; Healy and Perry, 2000; Saunders *et al.,* 2007). These approaches are concerned with how theories are used or developed. The inductive approach is to be used when developing a theory as a result of a date that is collected and analysed for this purpose (Saunders *et al.,* 2011). Moreover, it is usually used to answer "what" questions rather than "why" questions (Blaikie, 2000), while the deductive research strategy is useful in answering "why" questions (Blaikie, 2000) and can be used to discover an explanation or theoretical argument for an existing phenomenon. It seeks to test a theory by developing one or more hypotheses or research questions from it; this is then tested empirically by collecting data (Blaikie, 2000). Saunders *et al.* (2009) asserted that studies that employ an inductive approach to their data are very interested in the context in which a certain problem exists. This leads to the understanding that keeping a small sample for the study would bring about more valuable results as long as the data is collected using an inductive approach, which allows respondents to share detailed responses based on personal experiences (Saunders *et al.*, 2009). Furthermore, using an inductive approach allows the researcher to not construct a firm theoretical framework, as theory in such a study emerges out of the data collected and analysed during the study by means of identifying and testing relationships between themes discovered in the data and scholarly literature (Saunders *et al.*, 2009). Taking into consideration the research topic and purpose of this thesis, the most appropriate approach to conduct this research is the inductive approach. In addition, Merriam (1998: p. 9) claims that qualitative research primarily employs an inductive research strategy. Consequently, the qualitative method of collecting and analysing data is to be adopted, empirical data will be collected through semi-structured interviews, and the data will be analysed, through which the research aims to formulate a new theory.

The purpose of this research is exploratory, since it investigates the ERP implementation as an innovative solution to organisations. Research concerning this topic is in a state of relative infancy, and as a result of the inadequacies of existing theory, an exploratory approach is considered most appropriate. To Robson (2002: p. 59), an exploratory study is a valuable means of discovering "what is happening; to seek new insights; to ask questions and to assess phenomena in a new light". Saunders *et al.* (2009) point out the principal ways of conducting exploratory research and searching the literature, including interviews with "experts" in the subject. Taking all this into consideration, the exploratory approach is also adopted in this research. In such an exploratory study, it becomes necessary for the researcher to extensively research the literature so that a comprehensive understanding of ERP systems and their associated problems in contexts connected with the study's research problem can be established. With this in mind, the researcher declares this study carries a relatively broad scope to its findings. Using this approach also allows the researcher to adopt new, previously disregarded avenues of knowledge, as the study progresses. It remains a possibility that new data might change the course of the study's findings, adding more value than was expected at the time the study was initiated (Saunders *et al.*, 2009).

5.7 Research Strategy

Regarding research, a definition provided by Burns (2000) states that it is a systematic exploration, dedicated to finding answers to a problem. According to Sekaran (2000), business research is defined as a systematic, critical, organised, objective, databased, scientific analysis or inquiry into a problem, undertaken explicitly in order to discover its interpretation or solution. It can be easily observed that both definitions provide similar meanings in terms of finding explanations and solutions for different problems.

The fact that research on a social level is helpful in understanding and creating links between change, actions and experience can be disputed. Gilbert (1993) described the three key ingredients of acceptable social research as the creation of a theory, the course of collecting data, and the structuring of methods that help to collect this data. Hence, the primary element here is the consideration of the strategy of research, and the tactics available for a researcher’s work at hand.

However, the strategy for research can be a common plan used to answer the questions of research. This plan should include obvious tasks derived through the question of research (Remeniy *et al.,* 2002). Remeniy *et al.* (1998) contended that selecting and setting a strategy for research, accompanied by research tactics, and is regarded as a crucial step for initiating research work. They further commented that, at first, a researcher should decide whether the research is empirical or theoretical. Tactics and strategies are differentiated by Remeniy *et al.* (2002): conversely, the former refers to an overall approach adoption, whereas the latter deals with explicit details of analysis and data collection, thus the presence of a research strategy can enable researchers to ensure that their studies have an intangible framework.

The main research strategy that is adopted in this research is the case study, since it is the most appropriate strategy for this particular research (Yin, 1994). This is also echoed by Myers (2009) who stated that the most appropriate research strategy for conducting IS empirical research following the interpretive paradigm is the in-depth case study. The following sections discuss the justifications for adopting a case study strategy.

Case study strategy

Simons (2009: p. 21) defined case study as ‘’ an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a ‘real life’”. For Yin’s (1994: p. 13) a case study is “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident”. Yin (1994) emphasised that case study research is a very useful method as it allows expanding and generalising theories by combining the existing theoretical knowledge with new empirical insights. This is mainly important in studying issues that have not attracted much previous research attention. The use of this method can be valuable for transcending the narrow boundaries of the investigated cases, capturing new layers of reality, and developing new, testable and empirically valid theoretical and practical insights (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Ghauri, 2004; Glaser and Strauss, 1967; Stuart *et al.,* 2002; Tsoukas, 1989; Voss, Tsikriktsis, and Frohlich, 2002). The case study approach is an ideal methodology when a holistic, in-depth investigation is needed (Feagin *et al*., 1991). In addition, George and Bennett (2005) claim that case studies are generally strong precisely where quantitative studies are weaker. They have identified four advantages of case studies in comparison to quantitative methods. These advantages include (i) the r potential to achieve high conceptual validity, (ii) strong procedures for fostering new hypotheses, (iii) usefulness for closely examining the hypothesized role of causal mechanisms in the context of individual cases, and (iv) their capacity for addressing causal complexity (ibid.). Therefore, case studies are especially helpful when “how” and “why” questions are being posed, and the researcher has little control over events (Yin, 1994). Case studies are especially helpful for discovery, description, mapping and relationship building, but they may also be used for theory testing, developing, refutation, refining (Eisenhardt, 1989; Gummesson, 2005; Woodside and Wilson, 2003) and identification of further research needs (Halinen and Törnroos, 2005; Siggelkow, 2007; Simon *et al.,* 1996).

However, although the case study is a distinct type of empirical inquiry, field research is not without its limitations. Normally, researchers have no control over independent variables during the case study that may limit the internal validity of the conclusions. Humphrey (2001, p. 97) stated that “there is no such thing as a truly 'correct' and 'balanced' case study - that two researchers are likely to produce two different case studies from visits to the same organisation”. This is obviously due to the way the case study reports is interpreted. Additionally, one of the key limitations of the case study is that the data gathered are related only to the case under research. However, despite the case study limitations, the data collected from a case study are richer in details and insights (Smith, 2003). The case study method is selected as a sound research method for this study and the unavoidable weaknesses of case research are accepted as method-related limitation of the research.

Justifications for using Case study strategy

The aims of case study based research is to give opportunity for diversity, complexity and avoid simplistic research designs (Eriksson and Kovalainen, 2008). The case study essentially focuses on understanding the dynamics present within single settings (Eisenhardt, 1989). In addition, it helps answering the research questions (Eriksson and Kovalainen, 2008) in order to meet the research objectives. The most significant feature of case study research is its focus on 'how' and 'why' questions (Myers, 2009) and for this reason is appropriate for descriptive and exploratory studies (Mouton, 2001).

The case study method is selected in this research since the phenomenon under consideration is investigated in a 'real life' context and its purpose is to achieve a highly in-depth understanding of the links between processes and behaviours in organisational environments. In addition, the case study enables the researcher to place the emphasis of the research in the context in which it happens and, more importantly, to ensure that the investigation would embrace and accommodate the key aspects surrounding the phenomena where little was known there. Furthermore, case study research is mainly preferred when studying complex phenomena (Yin, 2008). This justifies its frequent use and adoption in IS research (Walsham, 1995). Moreover, using a case study approach in research has several strengths including the ability to use a variety of research methods (Davies, 2007), its appropriateness to produce a sound interpretive understanding of human- technology interaction in the real social setting (Orlikowski and Baroudi, 1991), its methodological association with the interpretative approach (Eriksson and Kovalainen, 2008), to obtain sufficiently rich description that can be transferred to similar situations (Merriam, 2009) and the ability to establish rapport with research subjects (Mouton, 2001).

Research Plan

To achieve the objectives of this research, the research will be administered through a constructive plan consisting of three main phases (Figure 5.1). In phase I, the research problem was identified and followed by the innovation and ERP literature reviews. In addition, the study context will be discussed in this phase. Phase II, the detailed methodology design will be identified and discussed. In addition, the execution of the fieldwork and data analysis to finalise the results will be done in this phase. Lastly, Phases III, the data analysed will be discussed to finalise the results and then the conclusion and future research will be presented.

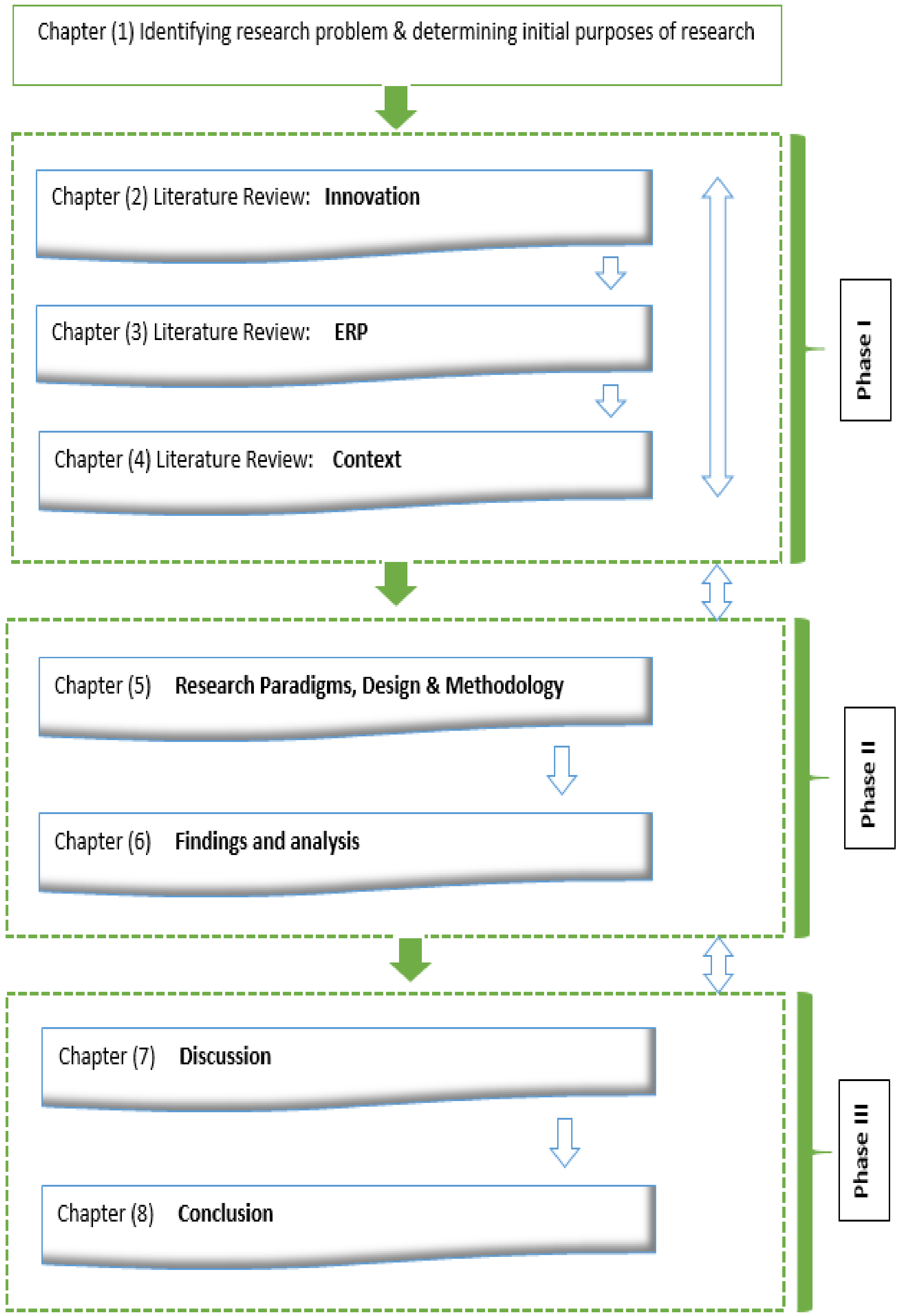


Figure 5.1: Research plan.

5.8 Data Collection

Data were collected through semi-structured interviews. The interview agenda (as presented in Appendix 4) was explained in emails and a phone conversations with participants prior to the face-to-face meetings. The data collected does not contain any information that may lead readers to the identity of participants nor their organisations. The data collection process is divided into three major phases:

- Preparation of the final research instrument (Appendix 4).
- Selection and contact to key participants (executives such as Chief Executive Officers, Chief Technology Officers, project managers, Chief Information Officers IT managers, etc.), and
- Data Collection through semi-structured interviews

The interview agenda and schedule are summarised in Appendix 4, which focus on collecting data from the following sections of questions to be answered by participants:

1. Participant's background, in order to check the demographic information.
2. Organisation and ERP background and implementation motives, in order to check organisations' ERP background and newness.
3. ERP scope, in order to investigate and discuss the complexity, scope and type of innovation of ERP.
4. ERP benefits, in order to identify and understand benefits to be obtained from the implementation of ERP.
5. Stakeholders involved in the implementation of ERP, in order to better identify and understand the role and importance of k stakeholders' involvement, project management and knowledge and Learning.
6. ERP Implementation Strategy, in order to examine and understand the ERP implementation Strategy.
7. ERP implementation methods types, in order to examine and understand the ERP implementation method.

8. Diffusion of innovation (DOI), in order to better understand the attributes of the diffusion of ERP as an innovation.
9. Learning and knowledge sharing, in order to examine and assess what has been done to foster learning and knowledge sharing.
10. Organisational culture, in order to examine and comprehend the culture arrangement that support learning and knowledge sharing.
11. Final thoughts, to give interviewees a chance to add any important information that was not directly covered previously.

Semi-Structured Interviews

According to Saunders *et al.* (2007: p. 601), a semi-structured interview is a "wide-ranging category of interview, in which the interviewer commences with a set of interview themes but is prepared to vary the order in which questions are asked, and to ask new questions in the context of the research situation". Ghauri and Gronhaug (2005) asserted that the semi-structured interview requires effective and careful communication skills. This method allows researchers to ask subsequent questions and enrich their data (Ghauri and Gronhaug, 2005). In addition to this, semi-structured interviews are more flexible regarding the use of a written schedule to direct the interview, which means the researcher is more focused on the interviewees.

Interviews will be conducted with organisations that implemented the ERP system prior to 2011, in order to have a better understanding of the ERP as an innovation in Saudi Arabia. These interviews are conducted with at least one executive involved in ERP implementation from each organisation. The interview schedule as summarised in Appendix 4 contains a set of questions, which will be investigated in the fieldwork by the researcher. The Schedule contains specific pre-determined questions, in order to have standardised techniques to conduct interviews and conversations and therefore recording them. The reason for standardisation techniques is to ensure that all respondents reply the same questions; that is, any given questions have the same meaning for all the respondents. In addition, interview schedule helps the researcher as a reminder of what needs to be asked during the course of data collection. For instance, the researcher, when taking notes during the interview, can have better control of the discussion and prepares what should be the next question to be asked after each response. Therefore, it would increase the richness of description and reliability of the data collected.

Population and Sampling Frame

The current research obtained the sampling frame from the listed companies on the Saudi Stock Exchange Company (2013), the governmental and not-for-profit organisations where the ERP system is already implemented, the list of the top 100 Saudi companies (Forbes Middle East, 2013) and from prior research involving Saudi organisations.

Although the interviewees were conveniently (non-randomly) sampled (Oates, 2006), which is the norm in qualitative research, the interviewees were adequately representative of the total population, since they represent 12 sectors and industries from both public and private sectors. The main criteria for the selection of these organisations are: 1) these organisations have the ERP running for at least five years, 2) executives are involved with the implementation, and 3) the researcher has access to these organisations.

The selection of these organisations is partially based on their participation in previous ERP studies (e.g. Al-Turki, 2010; Al-Mashari *et. al*, 2003), which confirms that these organisations have already implemented ERP systems and may increase the chances of their participation in this research. It is worth mentioning that the researcher has access to all of these organisations. Other new organisations that have not participated in previous research were added as well. Selection was also based on the date of their ERP implementation project, which was to be prior to 2011, in order to have a clear view of how successful the implementation has been.

The researcher conducted semi-structured interviews (Shanks *et al.,* 1993) with senior management from 25 public and private sector organisations. Semi-structured interviews were used, due to the flexibility they allow in data gathering. The number of responses fits comfortably within the recommended range of twenty to thirty respondents (Bryman 2012: p. 425) recommended for this type of study. An interview guide was developed based on the literature findings on the key factors for ERP implementation as an innovation (Appendix 4).

Interviews, according to Healy and Perry (2000), can provide a good understanding of different viewpoints, and can also assist in collecting rich insights to explore and identify attitudes and influences. Furthermore, they allow for greater control over the interview setting (e.g. sequencing of questions), and the clarification and collection of additional information when needed (Frankfort-Nachmias and Nachmias, 1996; Walsham, 1995; Hannabuss, 1996). It is worth noting that, with regards to business transactions in the Arab culture, there is a tendency to prefer more personal contact than any other form of communication (Muna, 1980).

Organisations were selected from different sectors in order to cover as many key sectors and organisations as possible, representing banks and financial services, agriculture, education, health and hospitals, hotels and tourism, industry, logistics, the military, retail, telecommunications and IT, and transportation. The researcher has direct and solid access to top management in most of these companies and industries. The interviews were conducted with senior managers, including the Chief Executive Officer, Chief Technology Officer, project managers, the Chief Information Officer and business managers with direct involvement in the adoption and implementation of ERP in their respective organisations.

To effectively record the interviews, two recording devices were used during every session so that the chances of losing data due to equipment's failure may be reduced significantly (Oates, 2006) while the researcher also took detailed notes. The audio files were catalogued and then transcribed separately for each interview session and respondent. They were then compared with the written notes collected during the interview session for a more robust analysis (Oates, 2006). The Arabic interview responses and transcripts were translated into English after which a qualified PhD in the same field of knowledge reviewed them to remove bias and add to the data's validity and reliability.

Unit of Analysis

The main unit of analysis in this research is the organisation. In this particular study, ERP implementation is analysed with an organisation-level construct, since users depend on their organisations to provide them with ongoing support, such as training, maintenance and equipment updates in order for implementation effectiveness to be realised (Holahan *et al.,* 2004). Therefore, the research participants are the key people, including senior managers, who manage the implementation process and are engaged in ERP implementation of the ERP system.

Pilot Study

Using a pilot study differs from one researcher to another; there is no one way that is agreed upon (Dillman, 1978). Moore and Benbasat (1991: p. 198) assert that questionnaire development goes through three stages: 1) item creation, by identifying the existence of constructs in the literature that could measure the research constructs and/or creating new ones if none exist, 2) reviewing these items to ensure their usability by experts and practitioners, and 3) testing the entire questionnaire prior to the final launch.

A couple of pilot interview sessions was undertaken to fix any problems in the process to improve data quality and results. The pilot interviews allowed the researcher to not only make necessary revisions in the interview questions but also to refine the research questions prior to the final interviews (Kvale, 2007). For this purpose, two independent

ERP consultants were selected. They were instructed to respond to the prepared interview questionnaire and provide input on any terms, ideas, and phrases that may confuse a respondent. The results of the pilot interviews were then used to revise certain questions and statements in the questionnaire and were taken back to the pilot respondents who declared them clear of previous errors. The new questions were tested before further practice to ensure validity and meaningful order and their ability to extract the right information, secure detail and meaning, and encourage respondents to open up and provide more detail (Hermanowicz, 2002).

Follow-up Interviews

Follow-up interviews were conducted for two reasons. First, to discover the reasons for missing data in some of the questions and, second, to check and confirm data that were not clearly mentioned in the interviews. An example of this objective is that the interviewees were asked for key reasons regarding the choice of a particular strategy or method; some answers were not clear. Another example is when they were asked to rank (from 1 to 5) their organisation's abilities in understanding, adapting and effectively using the ERP functions, some interviewees did miss one or more ranking or/and their justifications for choosing the rank for each ability. The issue of missing data and the need for more data clarifications was clear after commencing the analysis stage of data collected. As a result, six follow-up interviews took place, through a phone interview, in order to collect additional data and elucidate any unclear response before starting the data analysis. These follow-up events were found to be very helpful in addressing, for instance, some ambiguities and misunderstandings resulting in incorrect translation in Arabic. They consequently assisted in ensuring that the data collected was comprehensible, complete and sound.

5.9 Data Analysis

David and Sutton (2004) stated that evaluating questionnaire data concerns the examination of analytical terminologies and various social statistics. Furthermore, to accomplish the aims of the research, data must pass through some steps, including coding, entering and evaluating the data.

Miles and Huberman (1994) noted that there are no specific rules or conventions for analysing or interpreting qualitative data. Making sense of large quantities of data can be challenging, but it is possible to do this by sorting the data in terms of what is significant and what is not, investigating patterns, and communicating the information in a logical way (Patton, 2003). Here, the researcher's task is to ensure that the data makes sense and allows analysis to emerge. The researcher must also monitor biases, perceptions, and procedures, and be as honest as possible (Patton, 2003). While there are different ways to conduct a qualitative study, there are also different ways to view the data for analysis and interpretation.

The analysis for this study involves sorting and coding a numerical representation of categorical data, categorising and determining qualitative descriptions for themes (Fraenkel and Wallen, 2009). This analysis views the phenomena of interest through the eyes and thoughts of the study participants. Systematic rigor, the reading, and re-reading of the data for themes, was used to allow the data to be reflected in the best possible way (Patton, 2003). The analysis of the interview results was broken down into clearly defined steps proposed by Patton (2003).

The first step of the analysis would be to read each interview transcript multiple times before its statements would be analysed. Therefore, it allowed the researcher to develop an overview of the themes present in the statements of a given respondent. The second step of the analysis was the coding of the statements using MAXQDA software program. Coding is a common method in descriptive interview analysis wherein the researcher uses labels to describe the thematic meaning of phrases, sentences, and paragraphs. The next step was to keep a constant check on the coded data that was focused on comparing the labels and ensuring one label was used to code one theme throughout the data. The last step in the process to make the data ready for descriptive analysis was to employ the coding method. This step allowed the researcher to improve on the coding techniques and taking the process from unfocused and generic labels to more focused, detailed, and a specific number of coded labels. In order to remove bias and perform the task in a more organised and effective manner, this study employed the use of MAXQDA software. The resulting data was coded in detail and contained specific themes that had developed in the responses recorded with the interview respondents.

When the data collection was completed, initial coding was used in the first round of analysis to identify the main themes, representing the theoretical findings from the literature review. This initial coding was done by linking interviewees' answers to the interview questions (Appendix 6). In the second round of data analysis, coding was established according to interviewees' answers to discover the links between these themes. With such data rich with value at hand, the researcher moved to record the themes that emerged in the data. Five such categories (codes) of factors were identified in the data that were expected to have an impact on ERP learning and knowledge sharing within the organisations the respondents represented (Appendix 7). Furthermore, each related answer is then linked to both sets of codes. Table 5.3 shows some examples of the coding strategies used in this research.

Table 5.3: Examples of coding strategies.

Quotes Examples	Coding Question	Coding Categories
''Both the board of directors and top management are welcoming ideas and suggestions to improve ERP use. Users were encouraged to use ERP and try new functions'' (E16).	**Learning** - How open your organisation for new ideas and suggestions from the ERP employees to improve the ERP use?	**Learning** - Openness and experimentation
''ERP has far more services than managers and end-users had imagined; this caused some ongoing changes to the current process and ERP customisation as well. This kept changing as managers	**Diffusion of innovation (DOI)** - To what extent ERP systems are radically different from what the organisation had or did before?	**Diffusion of innovation (DOI)** - Complexity

and users became familiar with ERP'' (E5).		
''Communication is always encouraged; we have a monthly organisation-wide meeting with our chief board of directors, and many regular meetings between department heads and their employees'' (E18).	**Culture** - Is culture flexible enough to support freedom, provides good managers and staff empowerment and to encourage staff and departments interactions?	**Culture** - Dialogue and communication

In addition, an external auditor experienced in qualitative research was approached to review the codes and the code categories using code definitions and parameters established by the researcher. The employment of the external auditor established a coherent and agreed upon set of codes and themes, by to checking that the coding is appropriately used by the researcher.

Patton (2003) asserts that qualitative analyses radically deconstruct sets of data recorded in the form of statements and bring them back together into meaningful ideas traceable in the responses of other participants as well. Every category of codes assembled labels related to a bigger problem together and allowed the researcher to analyse the codes and labels, and their significance and meaning, separately as well as collectively as a group. For instance, the study identified the key conditions affecting the ERP learning and knowledge sharing as one major category to be analysed according to interviewees inputs. Ten subcategories (codes) are used to analyse the learning factors (Appendix 7).

The objective of this study is to include as many organisations that have implemented ERP systems as possible. Selected organisations in this study have experience of implementing the ERP system and using it for more than five years. Organisations were selected from different sectors and industries in order to offer a rigorous and comparative examination of the findings, which may be relevant to other organisations in Saudi Arabia. Moreover, investigating the implementation of ERP through different key sectors of the Saudi economy was considered helpful, making this study more rich and valuable.

The presentation of the data is organised according to four main categories of questions. Each category contains a group of related questions. The first section presents background information on the selected organisations and interviewees. The second section analyses the key factors affecting ERP implementation projects. The third section analyses the key learning and knowledge sharing enablers, based on a number of questions aimed at investigating how the different organisations approach learning and knowledge sharing to support the ERP implementation. The final section investigates how culture, structure, and climate influence the implementation, and the learning and knowledge sharing in organisations.

This study used one of the qualitative data analysis (QDA) software. MAXQDA, which designed to analyse qualitative data such as interviews; it assists researchers in identifying main concepts, ideas, themes and attitudes, among other factors, which could be extracted from such interviews, by labelling, classifying, grouping and categorising either a single interviewee's viewpoints or a number of interviewees' viewpoints as a group. It can also calculate the frequency of certain concepts, establishing the foundation for more in-depth and systematic analyses to help in judging the importance of the identified concepts. The decision to use MAXQDA was initially made on the basis of a huge volume of data. The possible alternative options were explored by attending three-day courses about the different packages available, before the decision was made to use MAXQDA. This was chosen mainly due to its ability to code data using languages other than English, for ease of use, and because the software is light and fast. Other software had not fully addressed these aspects. In addition, it did not take a long time to become familiar with this software package, which formed an important part of this decision.

The employment of MAXQDA was done to better tackle the expansive bodies of data collected during the interviews. Once some of the Arabic statements were translated into English (and audited), the transcribed data was analysed using the coding done through MAXQDA. The software allowed the researcher to independently inspect and enable the organised data sources for convenient reference later. Data was organised using bins and final transcripts of the interviews were put in to the software program, which coded the data promptly using labels and categories (bins). The sample demographics were compiled using Microsoft Excel Spreadsheet (Appendix 5) for compression and for data analysis that can be quantified, which will then enable further data analysis. It must be remembered the software package was used for organisation purposes only and not for analysing the data. Finally, MAXQDA helped the researcher in the process of refining the data collected by reducing the data to useful levels. Coding is also performed as part of a more fundamental objective of the researcher's. It helps in the process of reduction of data, which is a common step of qualitative studies done with significant amounts of data. Reduction of data is done by means of organisation, sharpening, discarding, and sorting of the data so that clearer conclusions can be reached with as much clutter out of the way as possible.

Reliability

Weber (2004) claims that Interpretivists believe that research is reliable if researchers can demonstrate interpretive awareness. That means, in the conduct of their research, interpretive researchers need to demonstrate that they have acknowledged the subjectivity they bring to the research process, and that they have taken steps to address the implications of their subjectivity. Sekaran (1992) stated that reliability is used to determine stability and permanence in order to assess the "goodness" of evaluating the concept. Reliability is the extent to which the measuring instrument is free from errors. In positivist research, reliability is usually high; hence, it is essential to repeat the study to retest the level of reliability, as it is a major functioning approach to reliability (Tull and Hawkins, 1993). On the subject of reliability of data, it is a common assumption in interpretivist research that a study may be proven reliable with demonstration of the researcher's satisfactory awareness of data interpretation (Weber, 2004). In other words, reliability of a study may be proved if the involved researcher(s) demonstrate that they acknowledge the subjective nature of the data involved and show they undertook satisfactory actions to address the adverse effects of such subjectivity. In the case of interpretive research, the level of reliability may not be to the same extent, or it may be translated into various approaches. A reliability test was implemented through the use of pilot studies. In addition, in different parts of the questionnaires, the researcher aimed at including questions for the purpose of checking the reliability, validity and consistency of the interviewee answers. For instance, questions about culture were included in different sections of the interview to cross-reference interviewees' answers. In addition, experts in the field were used to further enhance the reliability and validity of this research.

Validity

According to Weber (2004), interpretivists are concerned that their claims about the knowledge they have acquired via their research are defensible. Remeniy *et al.* (1998) argued that the term "validity" is associated with the degree to which something being observed or measured is similar to what was believed to be observed or measured. Furthermore, validity is an essential factor in selecting an instrument for research (Leong and Austin, 1996). Validity, however, has two basic forms: external and internal. Internal validity is the ability of the research instrument to appropriately measure what actually needs to be measured, and external validity is the capability of the research instrument to generalise the results (Emory and Cooper, 1991). The pilot study and the use of experts were used to internally validate the instruments. The omission of one's own preconceptions, when seeking to understand the phenomena under investigation, must be ensured during the whole process during which the research study is conducted. This can be achieved by going about data organisation and analysis in a manner that focuses on describing the statements first, moving on to explaining them, while keeping track of plausible alternate interpretations so they do not go unnoticed (Weber, 2004).

Generalisability

According to Remeniy *et al.* (1998), generalisability is the ability of the investigation results to be helpful in other similar situations and for greater populations. This means that the main concern is the suitability of theories to generate similar findings in various settings. Generalisability pertains to the logical development of the area of sampling design, and the quantity of specific details that are required to be followed during data collection. Conboy *et al.* (2012) argue that, to give meaning and to explain the raw qualitative data, the involved researcher(s) have to develop a more generalised state of the statements. Thus, the implications, which may be similar or even the same but may read differently due to the varied selections of words by distinct respondents, become clearer and are not disregarded. This process ensures sufficient generalisation of the data at least in terms of describing the studied phenomena. On a related note, scientific researchers generalise from empirical observations by developing new concepts and propositions as a means to building theory.

Walsham (1995) posits generalisation can also be achieved in qualitative studies using the following steps: generation of concepts, development of theory, deriving implications with focus on specificity, and contributing with insights rich with value. In addition, by performing primary research, the study was able to explore the effect of the ERP implementation as an innovation in Saudi Arabia. Generalisation to other developing countries may need further investigations which should take into consideration the specificities of their context. Thus, local cultures, level of knowledge and competencies among other aspects, need to be investigated.

Ethical Considerations

The researcher assured participating organisations and individuals that the issues of confidentiality, anonymity and identifiability are be addressed through two mechanisms. First, a letter from the Embassy of Saudi Arabia requesting the authorisation from the selected public and private organisations to conduct the empirical research within their businesses. This also served as an assurance about the objective of this academic research. Second, a written statement by the researcher was made available to participants, explaining that no key data nor any names or data would be made public. In addition, the researcher maintained a strong sense of ethical responsibility in terms of collecting data, analysing facts and producing findings. Required citations have been provided throughout the research. Most importantly, the researcher behaved with the highest integrity prior to and during the recording of interviews (Oates, 2006: p. 60). Appointments for the interview sessions were booked keeping the convenience of the respondents in mind. Their preferences were noted and used for the interviews. The purpose of the study explained in detail once in the email sent to them with other important information and once more before the interview began. This was done to eliminate any confusion or doubts about the study, which resulted in more focused responses and clearer replies.

5.10 Summary

This chapter presented the most commonly used research paradigms and methodologies in IS research. It shows that positivism, interpretivism, critical realism and pragmatism are the most common paradigms within information system management, while pragmatism and critical realism rarely underpin studies within the IS field. Evaluation of the research focus and prevailing methodologies suggests that the case study within the interpretivism paradigm is the most suitable approach to the study. By conceiving it within the tenet of interpretivism, the study would not only identify the main enablers and inhibitors in the ERP implementation, but would also refine and redefine the measures for successful implementation – thereby identifying the deeper insights and circumstances required for understanding the effect of learning and knowledge sharing on ERP implementation.

Chapter Six: Findings and Analysis

6.1 Overview

This chapter aims at presenting the findings and the analysis of the data collected through the semi-structured interviews. Moreover, it aims to identify the factors that might affect the ERP implementation, with specific reference to Saudi Arabia. The presentation of findings is grouped into five sections; the first one presents the background information on organisations and interviewees, while the remaining four are presented according to the four main research questions. The first section shows that 25 organisations, representing 12 industries, were investigated in this study (Table 6.1). The second section analyses the organisational factors affecting ERP implementation. The third section analyses the factors affecting the adoption and diffusion of the ERP project. The fourth section analyses the factors affecting ERP's learning and knowledge sharing. The final section analyses the cultural factors affecting ERP learning and knowledge sharing.

Table 6.1: Participant interview codes

Interviewee Codes	Organisation Codes	Sector	Industry	Position
E1	O1	Private	Telecommunications & IT	IT Consultant
E2	O2	Private	Telecommunications & IT	IT Consultant
E3	O3	Private	Real Estate	IT Manager
E4	O4	Private	Agricultural	ERP Project Manager
E5	O5	Semi-Gov.	Health	ERP Project Manager
E6	O6	Private	Agricultural	IT Manager
E7	O7	Private	Industrial	IT Manager
E8	O8	Private	Retail	Chief Information Officer (CIO)
E9	O9	Private	Transportation	ERP Project Manager
E10	O10	Private	Industrial	ERP Project Manager
E11	O11	Government	Banks & Financial Services	IT Manager
E12	O12	Government	Education	Vice President (VP) IT
E13	O13	Semi-Gov.	Health	Director of Information Technology
E14	O14	Private	Telecommunications & IT	Chief Information Officer (CIO)
E15	O15	Private	Banks & Financial Services	ERP Project Manager
E16	O16	Private	Industrial	Director of Information Technology
E17	O17	Government	Banks & Financial Services	Chief Information Officer (CIO)
E18	O18	Government	Hotels & Tourism	Director of Information Technology
E19	O19	Private	Retail	Vice President (VP) IT
E20	O20	Government	Military	IT Consultant
E21	O21	Government	Health	ERP Project Manager
E22	O22	Government	Telecommunications & IT	Director of Information Technology
E23	O23	Private	Logistics	Chief Information Officer (CIO)
E24	O24	Private	Banks & Financial Services	Chief Information Officer (CIO)
E25	O25	Private	Telecommunications & IT	Director of Information Technology

6.2 Organisations and Interviewees' Background

This section presents some relevant background information on the organisations and interviewees in this study. This background information will allow the exploration of potential links between such information and the implementation of ERP. It includes organisations' sector and industry categories, sizes, ERP implementation years, experiences prior to ERP implementation, interviewees' positions, interviewees' qualifications and interviewees' ERP experiences.

6.2.1 Organisation sector and industry categories

The majority of the interviewees (16 out of 25) are from the private sector (Figure 6.1), while the remaining nine organisations are from the government and semi-government sectors. Appendix 5 presents organisations and interviewees' background.

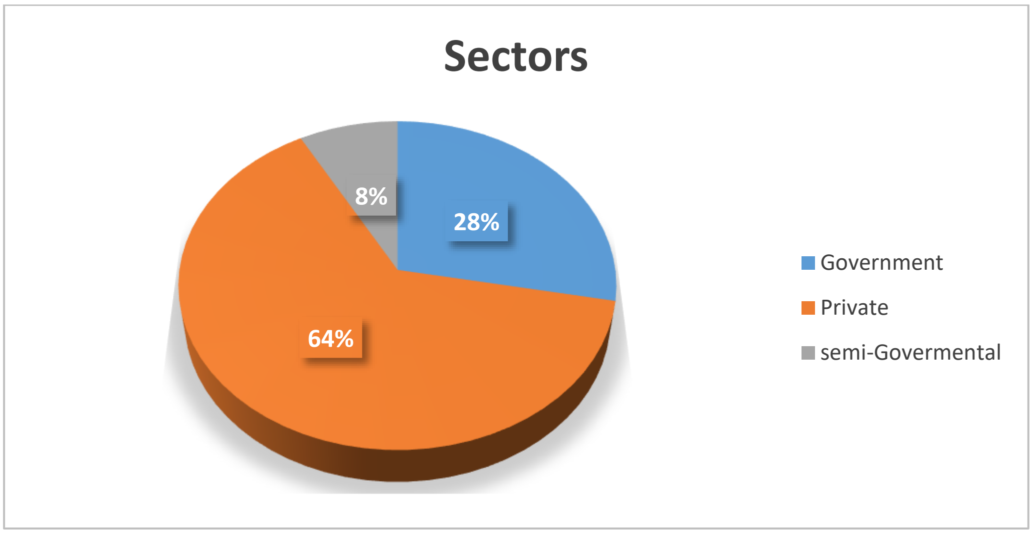


Figure 6.1: Organisation sectors

Interviewees' organisations represent 12 different industries (Figure 6.2). These industries include: banks and financial services (4 organisations), agriculture (2), education (1), health hospitals (3), hotels and tourism (1), industrial (3), logistics (1), military (1), retail (2), telecommunications and IT (5), transportation (1) and real estate (1). The majority of these industries are highly dependent on IT for their services and products (e.g. banks and financial institutions, telecommunications). IT forms the backbone of their operations.

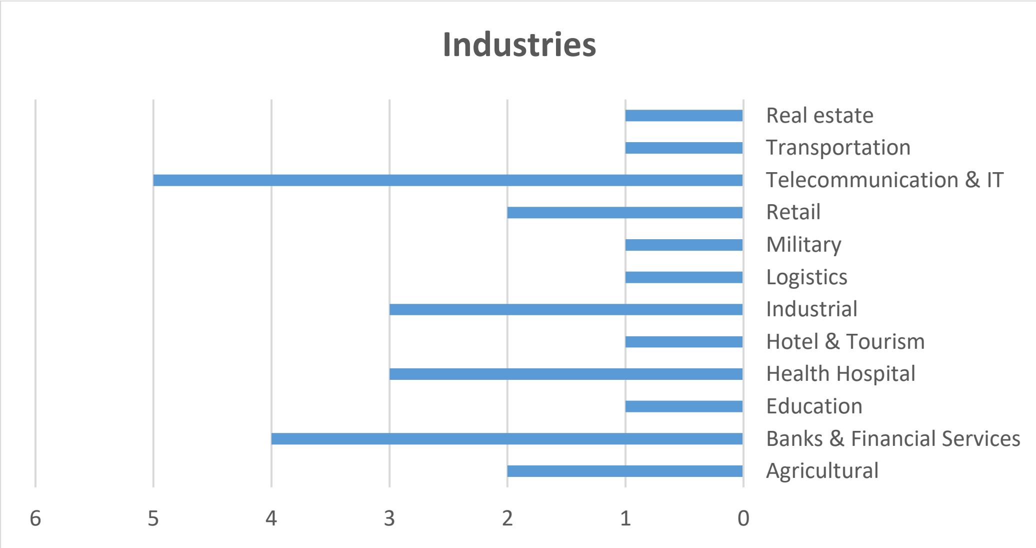


Figure 6.2: Organisation Industries

6.2.2 Organisations sizes

Out of the twenty-five organisations studied, sixteen of which are considered large organisations in terms of number of employees, while six organisations are mid-size, and only three organisations are small organisations employing fewer than 150 employees (Figure 6.3).

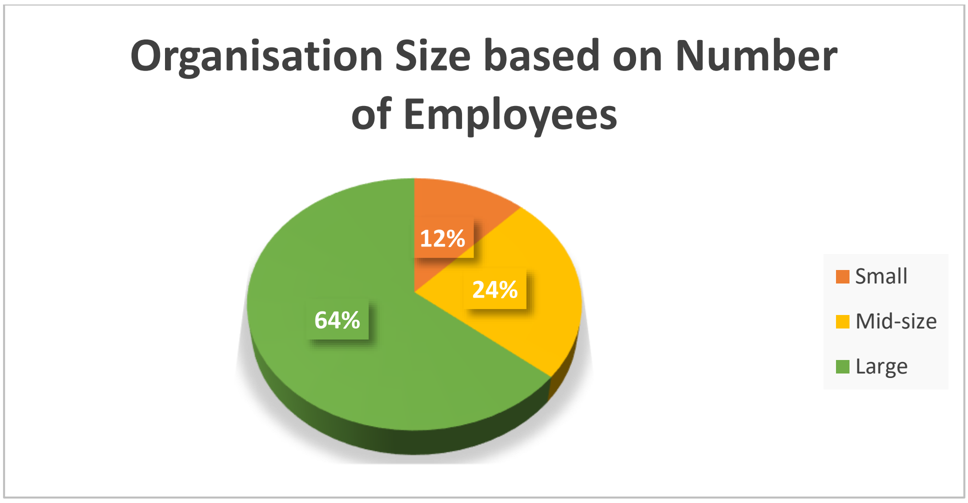


Figure 6.3: Organisation size

6.2.3 ERP implementation years

One executive from each organisation was interviewed. The selected and interviewed executives and organisations had all been involved directly with ERP implementation, prior to 2011 at the least and were selected in order to have a better understanding of ERP as an innovation in Saudi Arabia (Figure 6.4).

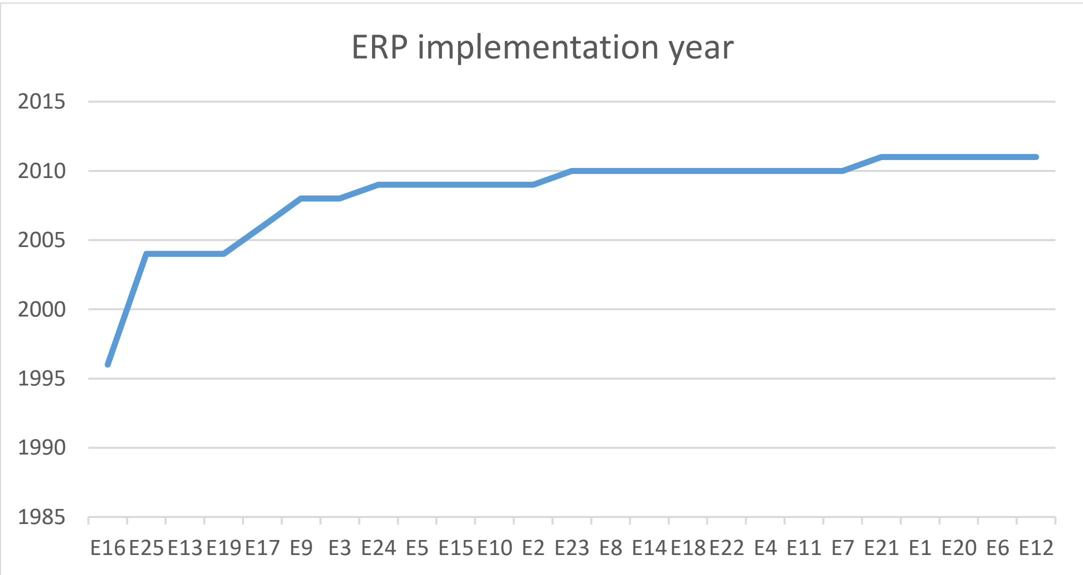


Figure 6.4: ERP implementation year

6.2.4 Organisations' experiences prior to ERP implementation

Thirteen organisations had been in business for over ten years prior to implementing the ERP system, which shows that these organisations had a well-established business process in place, while only six organisations had been in business from five to ten years. The remaining six organisations had less than five years in business (Figure 6.5).

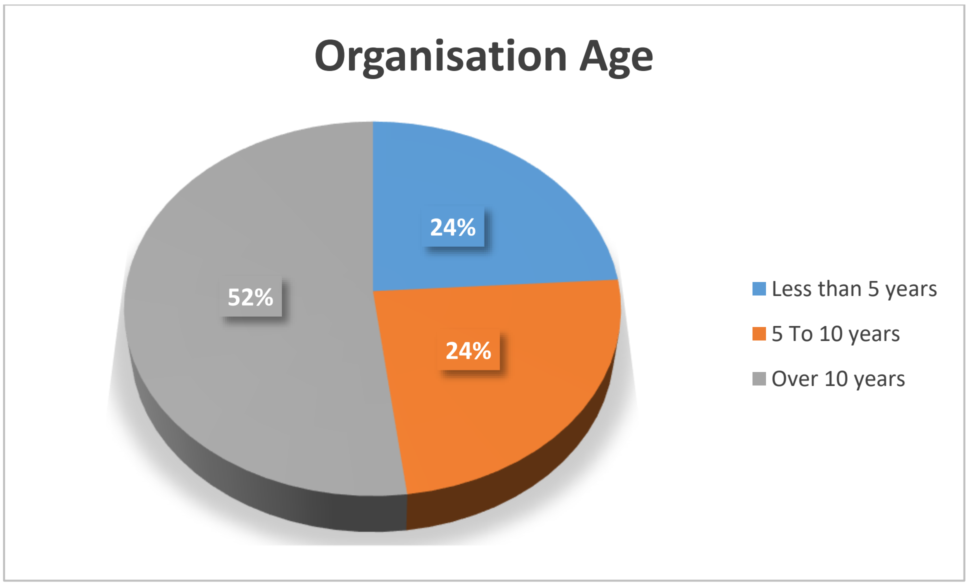


Figure 6.5: Organisation age at the start of the ERP implementation project

6.2.5 Interviewees' positions

Twenty-five organisations were investigated in this study. All the respondents provided consent for the interviews to be recorded. Moreover, all of the interviewees were in charge of ERP systems. Nineteen out of twenty-five interviewees held executive positions. The interviews consisted of two vice presidents overlooking IT functions, three IT consultants, five directors of IT, five CIOs, four IT managers and six ERP project managers (Figure 6.6). All of them were involved in the implementation of the ERP system. This gives the study not only the breadth but also the depth needed to study such a complex system.

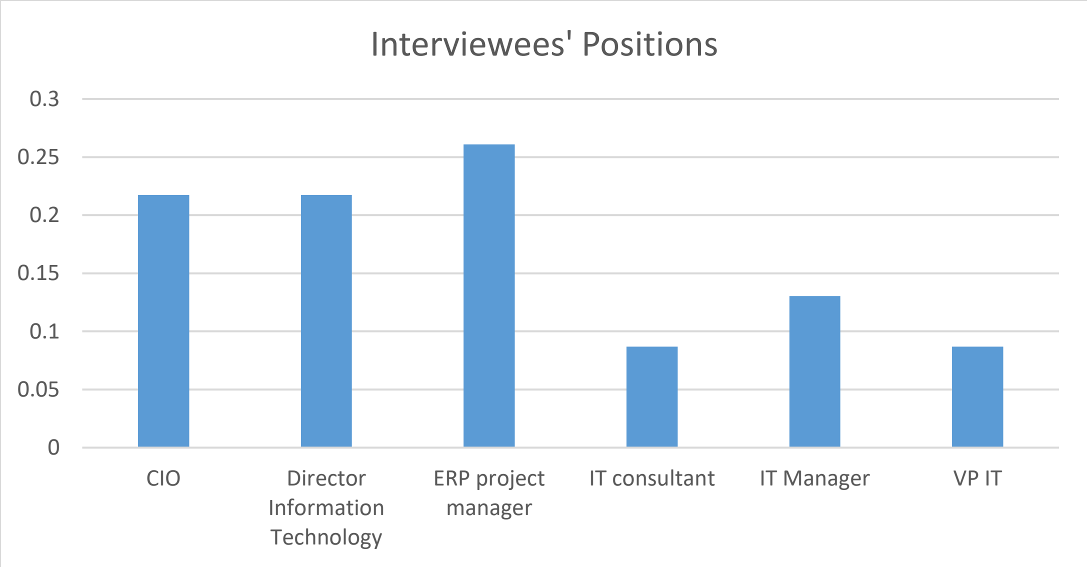


Figure 6.6: Interviewees' positions

6.2.6 Interviewees' qualifications

The majority of interviewees are well educated, three interviewees have a Ph.D. degree, while eleven interviewees hold a Master of Science (MSc) or an MBA, leaving eleven interviewees hold bachelor degrees in computer science. One executive is a professor in the field of information systems and technology management (Figure 6.7). This indicates that most of the executives and managers interviewed are well qualified and seem to be experienced in the management of ERP.

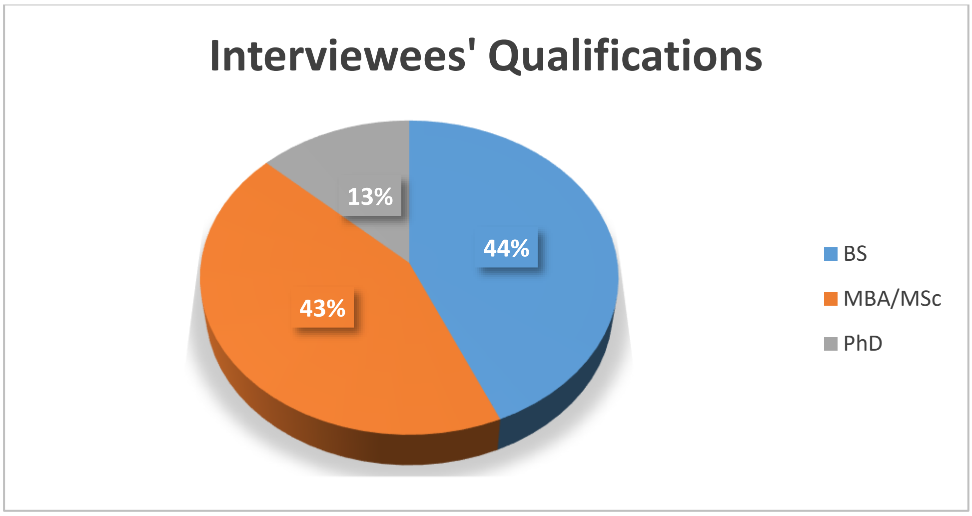


Figure 6.7: Interviewees' qualifications

6.2.7 Interviewees' ERP experiences

The average level of ERP experience among interviewees is seven years, ranging from five to thirteen years of direct involvement with ERP systems. The average level of experience with the same organisation is almost 10.5 years, ranging from four to twenty years working for the same organisation (Figure 6.8).

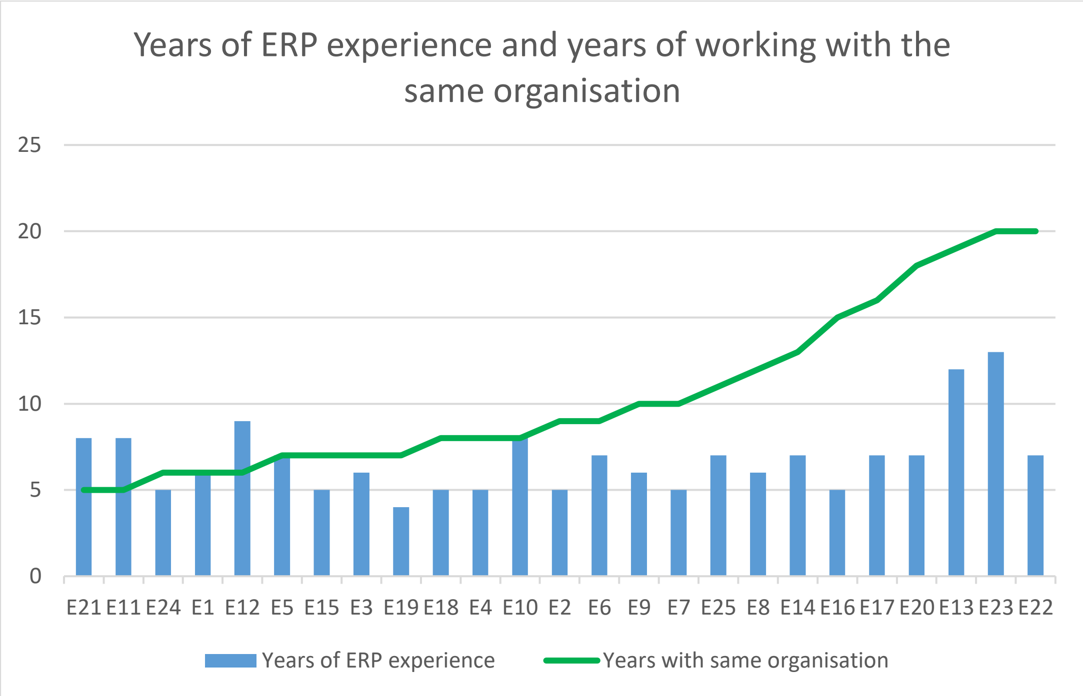


Figure 6.8: Interviewees' years of ERP experience and years of working with the same organisation

6.3 Key Organisational Factors Affecting ERP Implementation

This section is aimed at investigating the key organisational factors affecting ERP learning and knowledge sharing, and therefore, ERP implementation in the sample organisations. It investigates the organisational arrangements that enable or inhibit the successful implementation of ERP projects. As suggested in Table 3.4, this study found nine key organisational factors affecting the implementation of an innovation such as ERP. These factors include ERP system and vendor selection, the prior system(s) in place before implementing ERP, strategies adopted by organisations to acquire and implement the ERP system, methods adopted by organisations to acquire and implement the ERP system, ERP implementation scope, ERP project budgeted cost and time, implementation motives, organisational structure and change management. These factors are investigated in the following sections.

6.3.1 ERP system and vendor selection

The partnership between the implementing organisation and the ERP vendor is crucial throughout the ERP life-cycle (Somers and Nelson, 2004). No ERP implementation can succeed without employee training. Since ERP implementations entail significant change to the way employees work, training must be an integral part of a large system deployment. ERP vendors are creating training documentation that teaches people how to complete transactions in the system.

The findings show (Figure 6.9) that the Oracle ERP system is by far the most commonly implemented system by organisations (18 organisations). These organisations implementing Oracle ERP systems represent different sectors, industries and sizes.

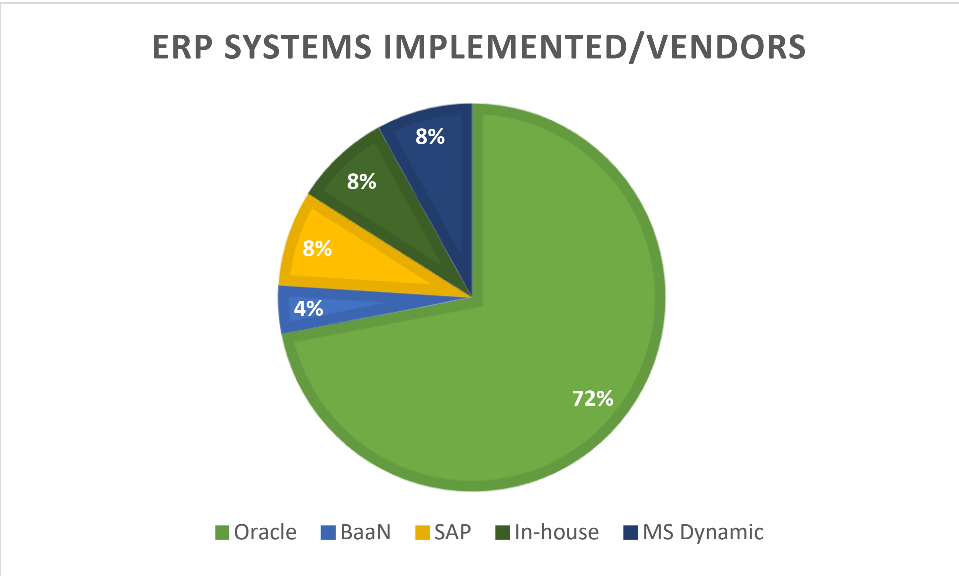


Figure 6.9: ERP system implemented

As shown in Figure 6.10, the interviewees identified nine key motives for their selection of certain ERP vendors over others. These motives include: 1) cost of the system (8 organisations), 2) the level to which the system fits their needs (6), 3) ability and flexibility to customise the system (5), 4) popularity of the vendor (3), 5) widely used by competitors (2), 6) availability of skilled staff in the market (2), the vendor's presence in the market (2), 7) technical support (2), 8) recommendation by consultants (1), and 9) staff's ability to use it (1). These reasons explain why Saudi organisations prefer Oracle systems over other ERP vendors in the Saudi market.

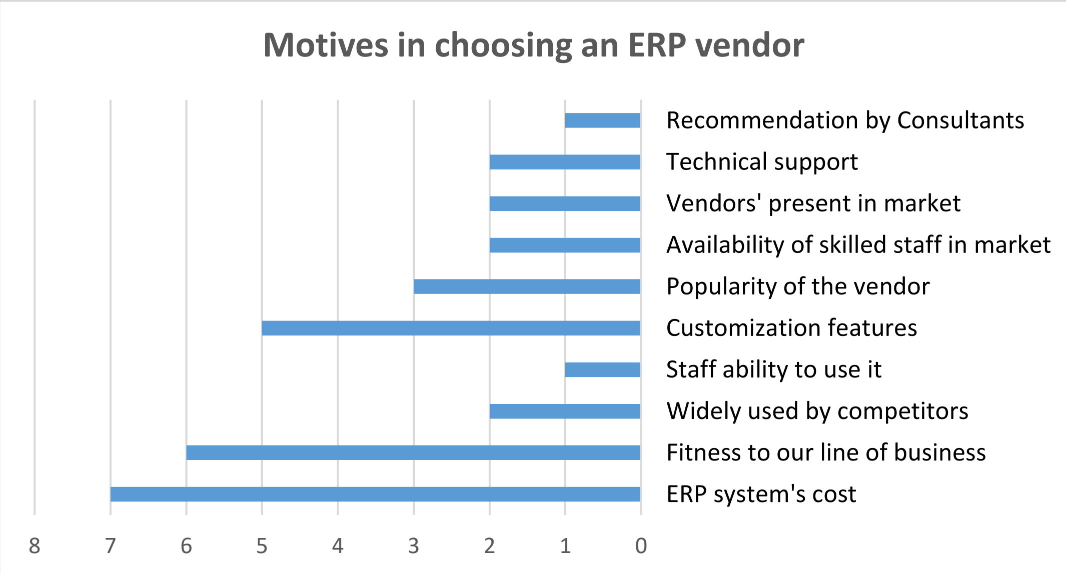


Figure 6.10: Vendor selection criteria

ERP systems are costly to implement, requiring substantial investment, which some organisations cannot afford. Therefore, such organisations look for available systems within their budgets. Eight interviewees suggested that the cost of the ERP system was the main factor for their decision. Five of these organisations are private organisations operating in the agricultural (O4, O6), transportation (O9), retail (O19) and logistics (O23) industries, while the remaining two are government organisations working in the banks and financial services (O17) and health (O21) industries. It is noted that all of these organisations either had a legacy system or a manual system prior to implementing the ERP system, except O19, which had an old ERP system in place.

For example, E23, a chief information officer in a private logistics company which implemented Oracle, emphasised the importance of having a system that costs less, which is used widely by competitors, and with which the staff are familiar. He states:

> *Oracle, as an ERP system, is widely used in our industry; most of our competitors are using Oracle, and its price is lower than that of other systems.*

The second most important reason for selecting a particular vendor is the level to which the system fits their needs. Different ERP systems may be suitable for particular types of business, since some vendors have different ERP versions that are designed for certain industries. This motive indicates that six organisations recognise the complexity of the system and seem to be aware of the need to select and acquire a compatible system that serves their needs more effectively.

E21, an ERP project manager, claims that they chose a system that is more familiar with regard to their process as a government organisation.

> *As a government organisation, Oracle is more familiar with our process. Therefore, it fits smoothly with our existing process. In addition, our employees are more familiar with the Oracle system than other systems.*

Five organisations suggested that the ability and flexibility of customising the system was a main factor in selecting vendors in order to be able to overcome and manage the complexity of the customisations. Other reasons for selecting ERP vendors mentioned by the interviewees include the popularity of the vendor (E9, E5, E25), widely used by competitors (E8, E21), the availability of skilled staff in market (E5, E11), the vendor's presence in the market (E11, E16), the availability of technical support (E16, E25), recommendations by consultants (E20) and the ability of staff ability to assimilate it and use it (E8).

From this sample, it is clearly indicated that Oracle holds the biggest share of the ERP market in Saudi Arabia. Organisations from different sectors, industries and sizes have Oracle ERP systems implemented. The most important criteria for choosing an ERP system were found to be ERP cost, fitness to the business, customisation features, and popularity of the vendor. In addition, it is quite therefore clear that the knowledge base exiting within the organisation and the level of absorptive capacity required for the effective use of ERP does not seem to be acknowledged as an important motive. Only one organisation has recognised the staff's ability to use it as motive to select the appropriate system for their organisation.

6.3.2 Prior system(s) in place before implementing ERP

Investigating the kind of system(s) organisations were using before implementing the ERP system will help the research to assess the importance and impact of prior knowledge and experience of using ERP or similar systems on the successful implementation of ERP. The implementation of ERP requires a high level of absorptive capacity, which enables an organisation to acquire assimilate, adapt and effectively use the new knowledge associated with the ERP system. An appropriate level of absorptive capacity of knowledge base increases the success rate of ERP projects and decreases the probability of failure.

It was found that prior to implementing the ERP system, the majority of organisations (15) had legacy systems, which are old computer programs, no longer updated or capable of handling business (Figure 6.10). The remaining ten organisations either had an old ERP system, or had no automated system at all. Five organisations had an ERP system in place prior to implementing the new system; therefore, the system was not new to the implementing organisation. This means that these organisations are very familiar with the use of IT systems in general and ERP systems in particular, since twenty organisations have used some kind of IT system.

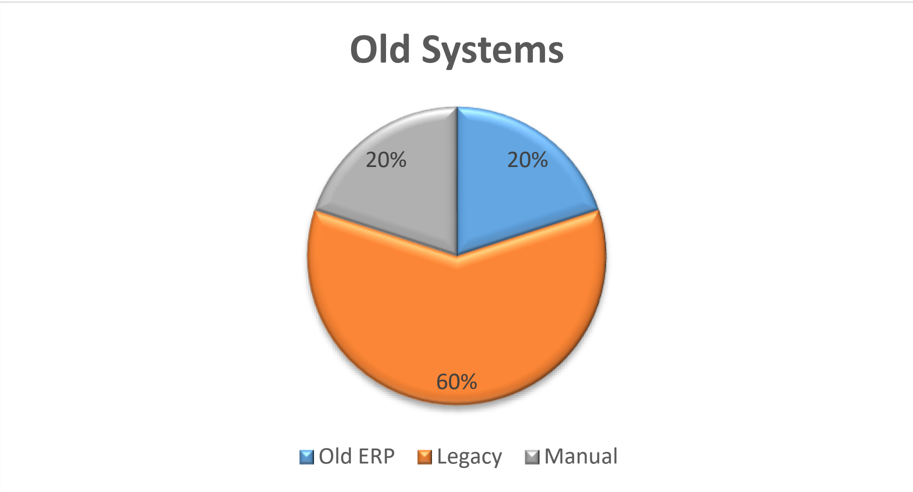


Figure 6.10: Systems in place prior to implementing ERP

This study shows that twenty organisations were implementing an ERP system for the first time; it is, therefore, considered new to them. However, for those organisations that had an old ERP system in place, meaning the system was not new to the implementing organisation. This could be an important factor in assisting the implementation of ERP, since the whole organisation is familiar with such systems.

6.3.3 Strategies adopted by organisations to implement the ERP system

Implementing ERP systems successfully requires an implementation strategy. ERP implementation strategies are based on the concept of making the transition from a legacy traditional system to a new ERP system. If the wrong strategy is followed, there is a high chance of failure (Khanna and Arneja, 2012). The findings show that organisations in this study have used different strategies to implement ERP systems (Figure 6.12).

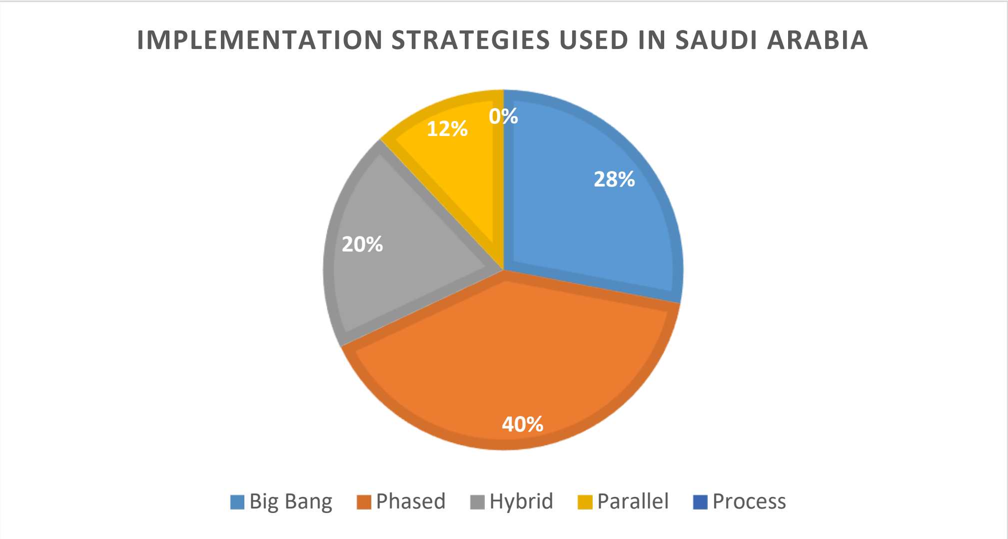


Figure 6.12: Implementation strategy

The phased strategy is used by ten organisations, most of which are large organisations (18) with a large number of employees and had been in business for over 10 years and had an existing process in place. There is no clear pattern or relationship between the organisations' sector, industry, choice of vendor, or systems in place regarding the choice of the implementation of this strategy. The use of the big bang strategy (7 organisations) suggests that there is no clear pattern or relationship between the organisations' sector, industry, size, choice of vendor, or systems in place regarding the choice of the implementation of this strategy. On the other hand, the hybrid strategy (5 organisations) is mainly used by large organisations with different locations and sub-organisations, and perhaps different functions make this strategy more effective than using one single strategy. Regarding the least used strategy, parallel strategy (4 organisations), the findings suggest there is no clear pattern or relationship between the organisations' sector, industry, size, choice of vendor, or systems in place regarding the choice of the implementation of this strategy.

To summarise, it was found that although some strategies seem to be used more than others, among the interviewed organisations there are heterogeneous decisions in terms of choosing the implementation strategy. This may be due to specific organisational characteristics, such as industry regulations and attributes, size, the old system in place, culture, structure, prior experiences, etc. The strategies used are the phased (10 organisations), big bang (7), hybrid (5) and parallel (3) strategies. The process line has not been used by any organisation in this study. This perhaps due to the fact that the process line strategy is more complicated and requires more prior knowledge base, hence, absorptive capacity.

6.3.4 Methods adopted by organisations to implement the ERP system

This section will identify the main types of implementation used by the sample of Saudi organisations in order to explain the motives, as well as the factors acting for or against their successful implementation. Some types of implementation could lead to a more complex and sophisticated implementation process, requiring different settings and different pre-implementation preparations, and therefore, more complex business process re-engineering (BPR) and/or major ERP system customisation. Figure 6.11 illustrates the ERP implementation methods used in Saudi organisations.

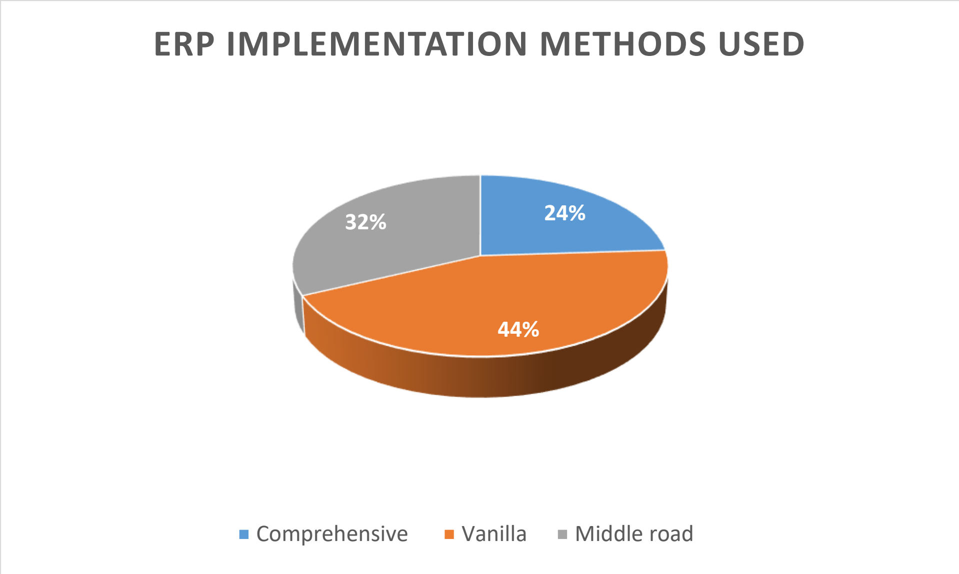


Figure 6.11: ERP implementation methods used in Saudi organisations

The findings show that the vanilla method is the most widely used among the studied Saudi organisations. Eleven organisations interviewed had used using the vanilla method in implementing the ERP system, either to avoid any customisation to the ERP system, or because there was no need to customise the system. Nine of organisations using this method were relatively new organisations with a manual process in place, while another nine organisations were undergoing major business process changes across their organisations. Eleven organisations had old legacy systems in place, and they needed to establish a new business process, while four organisations were upgrading their old ERP systems. This choice of this method could be attributed to the lack of good prior knowledge base and low absorptive capacity. Since complex methods such as the comprehensive method requires significant organisational change though BPR and a better level of knowledge base to acquire, assimilate, adapt and customise and align the system with their existing process in order to better use it.

In addition, the findings show that the second most used method is the middle road. In this method, customisation to the ERP system is made, along with a considerable level of BPR – unlike the vanilla method, where customisation is at the very minimum. Moreover, no major BPR is made either. This method is, as the name suggests, mid-way between the vanilla and comprehensive methods. Eight organisations used this method, where some customisation to the ERP system was made along with some level of BPR.

The findings show that only six organisations interviewed used the comprehensive method. This method is ambitious in nature, and requires substantial ERP system customisation efforts and resources, and a considerable level of BPR. It has been found that most of the organisations using this method are either sufficiently large to find it impossible to use ERP without any changes to the codes to reflect the necessary process.

To summarise, it has been found that although some methods seem to be used more than others, among the interviewed organisations there are heterogeneous decisions in terms of choosing the implementation method. This may be due to specific organisational characteristics, such as industry regulations and attributes, size, the presence of an old system, culture, structure, prior experiences, etc. The most used method is vanilla (11 organisations), followed by middle road (8 organisations) and comprehensive (6 organisations). This choice of methods used could be influenced by the level of prior knowledge base and absorptive capacity organisations had. Since complex methods such as the comprehensive method requires significant organisational change though BPR and a better level of knowledge base to acquire, assimilate, adapt and customise and align the system with their existing process in order to better use it.

6.3.5 ERP implementation scope

ERP, as a complex innovation system, needs special consideration in its implementation, such as an effective implementation plan. Therefore, changes in ERP scope could not only substantially affect the ERP project’s budgeted cost and/or time, but could also determine the overall success of the implementation project.

The findings suggested that despite almost all organisations having an implementation plan before they actually started the implementation process, nineteen organisations changed their implementation scope at one point (Figure 6.12). Only six organisations have not changed their implementation scope.

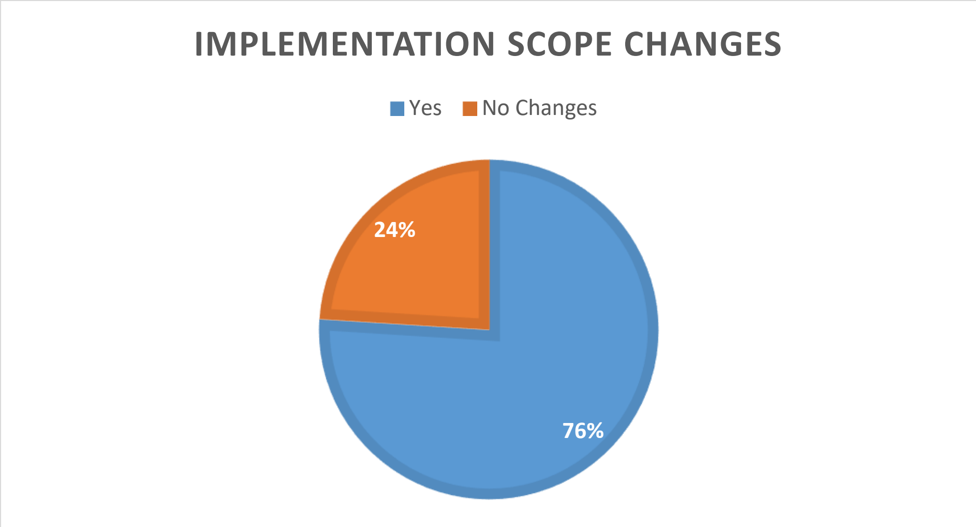


Figure 6.12: Scope changes during the actual implementation

Furthermore, the findings reveal that the primary reason for changing the implementation scope was that management and users alike lacked a full understanding of the process already in place, the ERP benefits, and the different functions of ERP. E3, an IT manager in a real estate company implementing vanilla Microsoft Dynamics in a phased strategy, expanded their scope due to new changes being requested by managers and users during the implementation project. These changes included adding more ERP functions in some departments. E3 states:

> *Some managers did not have enough knowledge regarding the existing processes and procedures in place, nor did they understand or show awareness of what ERP could bring to their function. This gap in knowledge led to an inaccurate design of the process they needed, which affected the scope dramatically. Our finance manager requested the cash management module after the start of the ERP project. As a result, we had an increase of around 10% in the budgeted cost and time for the project.*

This point is also supported by E5, an ERP manager in a large government hospital implementing ERP by using the comprehensive method and the big bang strategy, stating that:

> *ERP has far more services than managers and end-users had imagined, and this caused some ongoing changes to the current process and ERP customisation as well. This kept changing as managers and users became familiar with ERP.*

> *Overall, we had to change our scope a number of times to accommodate these changing requests, in order to include further changes concerning both the current process and customising ERP itself… the project's budgeted cost increased by 25%, while the budgeted time increased by 35%, as a result of new changes to the scope.*

Other organisations changed the scope in response to changes in the overall organisational ERP strategy after starting the implementation process, which saw some divisions/departments request to move to or move from the ERP system for their operations and functions. An example of this is the case of E19, a vice president for IT functions in a large retail company using an old ERP system. The company used the big bang strategy and the middle-road method to upgrade their system. E19 states that his organisation decided to use more modules and functions of the ERP system, which were not included in the original scope. These functions and departments were new to ERP and using it for the first time. This change of the original scope resulted in increased implementation costs and time by over 160% of the budget. E19 states that:

> *Top management expanded the scope during the project phase of implementation. They made a decision to add additional modules (i.e. human resources, fixed assets, quality control, procurement, inventory, logistics, shipping and sales modules) in the middle of the project phase. These functions and departments were new to using the ERP system, which is why they were not included in the first place. This required more implementation teams and an additional budget… the implementation project was over 160% of the budgeted time.*

In contrast, E6, an IT manager in a manufacturing company that used the phased strategy and the middle-road method to implement ERP, stated that his organisation actually cancelled some modules during the implementation to gain more control over the budget. However, their project was above budget on both implementation time (15%) and cost (10%), even after the cancellation of some modules. E16 states:

> *We had to reduce the scope of the ERP system, as top management decided not to implement some modules, in order to control the implementation budget*

> *that was increasing in both time and cost… we finished the implementation project with an increase of over 15% of the implementation time and over 10% on cost.*

Another reason discovered by this study is the speeding up of the implementation of some modules, so that users can feel some of the ERP benefits. E17, a CIO of a banking and financial regulatory government organisation, states that since the implementation took almost three years and users had not really seen the benefits of the ERP system, they changed the scope to focus on modules that could show some results to users.

> *The actual implementation took over three years; our end-users and managers started to feel bored by this long phase of implementation. Therefore, we decided to change our scope and started delivering modules that were not fully complete to satisfy them, so that they could see some progress. Later, we returned to each module and made the complete changes needed… Our budgeted cost increased by 25% and the budgeted time increased by 40% as a result.*

Lastly, in one instance, the scope changed as a result of a slow and interrupted implementation. The implementation project was put on hold by management a number of times due to changes in the implementation team. E14 is an ERP manager in a telecommunications company using the big bang strategy and the comprehensive method, which involved substantial changes in process and customisation as well. His organisation decided to go for a newer ERP version on the market. He states:

> *While we were implementing ERP, management made a number of changes to the implementation team. This caused the project to be postponed and delayed more than once. The last time the project started again, a newer version of Oracle was introduced. We decided to upgrade the current ERP system version, which changed the scope along with it… as a result, the project budget increased by over 200% in both time and cost.*

On the other hand, it was also found that six organisations did not make any changes to their original scope. These organisations either had a good implementation plan or were new and small organisations. E7, an IT manager in a large industrial company that used the phased strategy and the comprehensive method, claims that his organisation developed an effective implementation plan, where all implementation aspects were covered, and subsequently they did not need to make any changes. He states that:

> *We made no changes to our scope, since almost everything was thought of and either included or abandoned from the implementation scope. Therefore, we did not make any changes to the original scope. No extra budget was needed.*

The other reason for not making any changes to the original scope is mentioned by E25, an IT director in a newly established telecommunications company that used the big bang strategy and the vanilla method. He stated that since they were a relatively new organisation with a low number of employees, and working manually, they did not need to make any changes. However, they had exceeded their planned budget.

> *Since we were a relatively new organisation with small number of staff and working manually, we made no changes to our original implementation scope, as we did not need to.*

To summarise the above findings, the majority of organisations (19 organisations) experienced some degree of scope changes. It was found that the key reasons for these changes include management and users' lack of understanding of the ERP process and its functions and benefits, changes in the overall organisational ERP strategy, adding or cancelling certain modules, speeding up the implementation project, and a long time span as a result of a slow and interrupted implementation. However, some organisations did not make any changes to their original scope. These organisations had either developed an effective implementation plan, or were new and small organisations and did not possess the capability to introduce changes.

6.3.6 ERP project budgeted cost and time

The implementation of an ERP system is a complicated and expensive experiment for any organisation (Robey *et al.*, 2002). For most organisations, the implementation of ERP systems is the most crucial, time-consuming and costly change project they will come across in their history.

The findings show (Figure 6.13) that only four organisations have finished the implementation project according to the planned implementation timeframe and their budgeted cost. These four organisations have not changed their scope, which indicates that there is a good and skilled implementation team. These organisations represent different sectors, industries and sizes, and also, used different implementation strategies and methods.

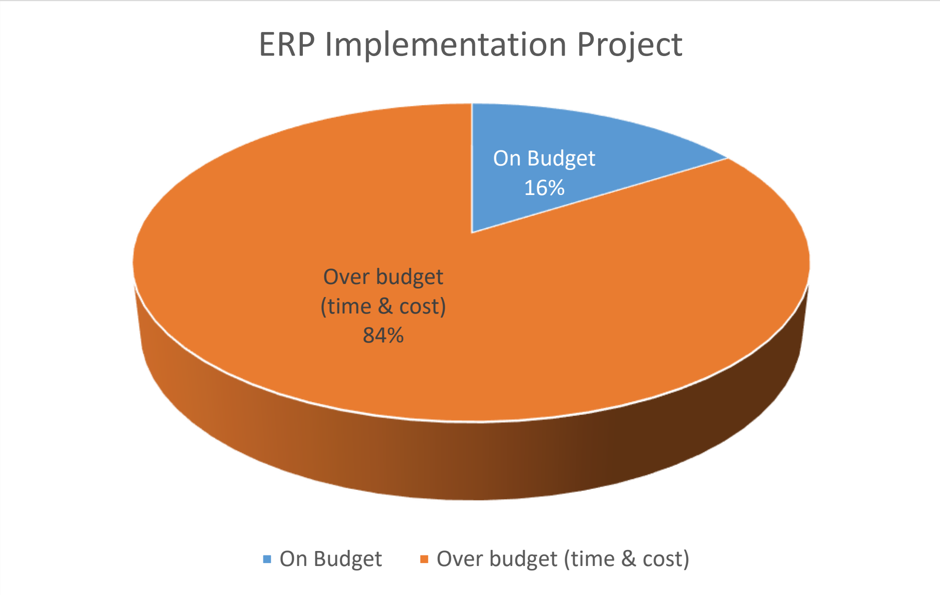


Figure 6.13: ERP implementation project time and cost

E22 is an IT director in a large government telecommunications organisation, which used the hybrid strategy and the vanilla method, attributing the good management of the scope and the planned budgets to the use of the vanilla method, avoiding any customisations which may have increased the complexity of the implementation, and therefore, increased the implementation time.

> *Simply, we chose the vanilla method to avoid customising the ERP, which is very time-consuming and complex. In addition, we needed to have the best practice business process that comes with the ERP system. This made us undergo substantial business process re-engineering in our process.*

Furthermore, the findings show that following an effective implementation plan, along with good technical support from the vendor and top management support, has helped organisations to stay within budget. E16, an experienced IT director in one of the largest petrochemical organisations in the world, which used the parallel strategy and the comprehensive method, stated:

> *…during the planning phase they listed the possible problems they may encounter during the implementation phase, and discussed these problems with related departments. In addition, we received good technical support from our vendor and positive support from top management, who had appointed an ERP project champion.*

The findings also found that as a result of changes to the original scope, twenty one organisations had actually exceeded their planned time, while seventeen organisations went above their budgeted costs. Furthermore, three organisations have finished the implementation project with over 50% increase of the planned time (Figure 6.14). The other eleven organisations have managed to finish the project with less than 20% increase in time, while only four organisations have managed to adhere to the planed timeframe.

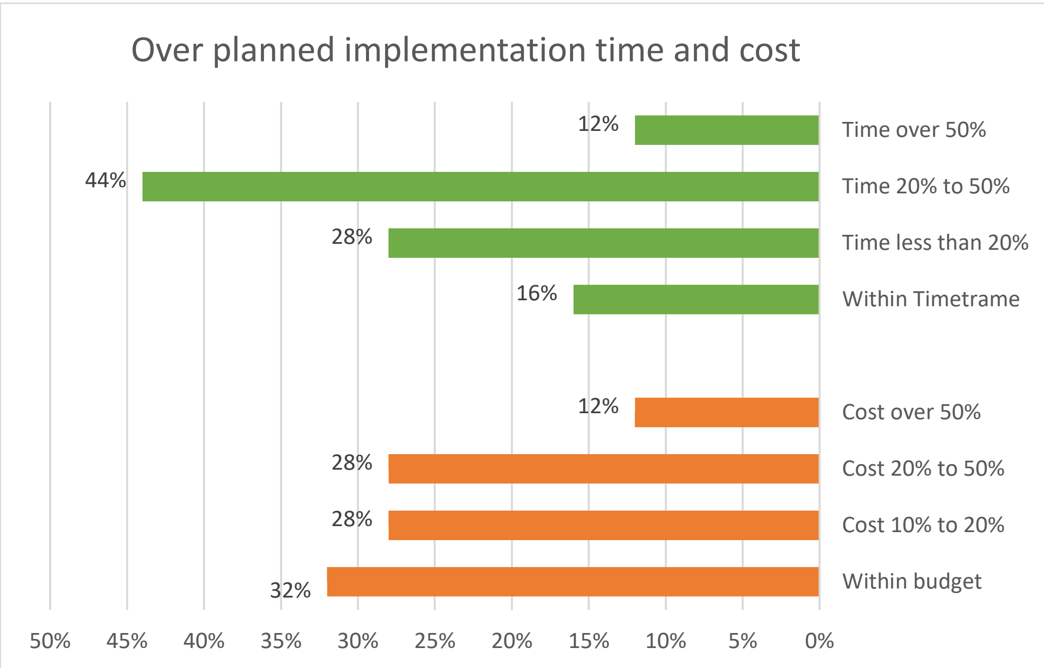


Figure 6.14: ERP implementation projects going over budget.

In addition, in terms of project cost, eight organisations managed to complete the project with no extra cost; some of these organisations expanded the implementation time but still managed to stay within the budgeted cost. It is important to note that some of these organisations are governmental entities, which means projects' budgets are fixed in terms of cost. Therefore, projects can be given extra time but not funds. Two organisations did not change their scope (O18 and O25); however, they had gone over-budget in terms of the planned project time. This means that scope changes may not be the only reason that organisations go over-budget.

In summary, it was found that changes to the implementation scope, in most cases, would negatively affect the implementation timeframe and budgeted cost. In addition, it was also found that what causes the scope to change also causes the rise of the budgeted cost and/or the timeframe. The few organisations that exhibited good control over their budget and timeframe also showed positive control over their implementation scope. Organisations that managed the scope effectively had a skilled implementation team, used the vanilla method, minimised customisations, developed an effective implementation plan, received helpful technical support from their vendors, and good top management support.

6.3.7 ERP implementation motives

Organisations may choose to implement ERP systems for different reasons. These reasons could affect the success of the implementation of the ERP system. For instance, these reasons determine the implementation scope, strategy and method.

The interviews have clearly shown that there are different reasons for implementing ERP systems among the interviewed organisations. For instance, E23, a CIO of a large logistics company, which had a legacy system, explained that one of the main motives to implement the ERP system is to operate on the same level as their international suppliers and affiliates:

> *Our company has international affiliations, and we need to comply with their systems in order to have proper transactions and to speed up the process. We also have customers and suppliers who we must link to our system. The only system capable of this was the ERP system, which allows for such integration.*

E10, ERP manager in a petrochemical company, believes that unifying the process across the whole organisation is the key motive for them:

> *Upon Shared Services concept integration, unification and process streamlining had to be done to prepare for future opportunities. In addition, we have some incompatible software that cannot be integrated; therefore, we need to stop using this. Another key motive for us is to integrate all our functions, activities and departments into one big system and one database.*

Moreover, some organisations were motivated by the need to replace their existing process and procedures with the best practices of the ERP system. For instance, E11, IT manager of a government regulatory organisation, added that they needed to improve their work process, gain more control over operations and staff, have more accurate data, and reduce operational costs.

> *A number of reasons drove the ERP implementation: work process improvement, accelerating the process, data accuracy, cost reduction, and gaining more control over staff. We have implemented the ERP almost as is, since we needed the best practices process, which is why we decided on ERP.*

This was also confirmed by other organisations that decided to utilise ERP systems as a response to a new strategy calling for process and procedures automation, and integration between data and process. This was emphasised by E17, a CIO of a banking and financial regulatory government organisation:

> *We took the decision to implement the ERP system for a number of reasons, of which the most important is that we work in a very regulated and controlled financial market; therefore, we had no choice but to automate, in order to improve and develop our existing process and procedures to cope with increasing market needs. In addition, we needed to integrate data and processes to acquire more operational capabilities to help us sustain our competitiveness, and to be well aligned with our overall strategy.*

Another reason for implementing an ERP system is to meet organisational expansion needs. This reason was mentioned by E16, an IT director of one of the largest petrochemical companies in the world:

> Simply stated, the two existing systems in the two companies we had were not suitable to accommodate the new requirements of the work we will approach in the future.

In addition, one of the key motives for implementing an ERP system is to mitigate the risk of running in-house systems and subsystems – systems that are designed and made by their own organisation, which runs their legacy systems. One risk associated with this is the inability to upgrade to meet their needs, or to observe proper maintenance of the software. One ERP manager (E15) in a large bank running a number of legacy systems stressed:

> *We had in-house developed software, which is very risky, since it was developed by one person and supported by the same person, and we do not have any idea how this program was designed. Nobody has any knowledge of this application or this system, and we are running under great risk. This is why we looked for alternatives; ERP was the choice to go for.*

The findings of this study show that organisations were motivated to implement the ERP system by a number of reasons. This indicates that these organisations acknowledge the benefits that an ERP system can bring to their organisations. The business reasons put forward by the interviewees include process unification, meeting required organisational expansion, integrating customers and suppliers, speeding up the process, reducing operational costs, gaining more control over operations and staff, and responding to regulatory requirements. The technical reasons mentioned include mitigating the risk of running in-house small systems and subsystems, having accurate data, integrating all functions, activities and departments, eliminating incompatibility issues, and acquiring more capabilities through ERP-integrated data and processes.

The selection of motives indicate a satisfactory knowledge and understanding of the potential benefits that ERP can deliver. However, the question is whether those organisations are well equipped and prepared in terms of human, organisational and technical resources in order to effectively assimilate, adapt and use ERP and get the expected benefits.

6.3.8 Organisational structure

Innovation is increased by the use of highly participative structures and cultures (Burnside, 1990). Therefore, organisational structure could either enable or hinder ERP implementation. A well-organised organisational structure could facilitate and positively affect the ERP implementation. Accordingly, a complicated and hierarchical structure could have an adverse effect on ERP implementation. Additionally, a well-organised and flatter type of structure would help organisations to speed up the process of adopting and implementing ERP, since the flow of commands goes smoothly and fluidly through departments.

The findings of this study show that most interviewees (19 out of 25) believe that a well-organised structure is essential not only in speeding up the implementation, but could also enable learning and freedom, employees' empowerment, and encourage staff and departments to use the system. For instance, E22, an experienced IT director in one of the largest governmental IT and science organisations, states:

> *Indeed, having an organisational structure that is designed properly and sufficiently flexible to make any necessary changes would provide good support for ERP implementation.*

Supporting this, E6, an IT manager in a manufacturing company, asserts that their existing structure was enabling effective ERP implementation:

> *One ERP project coordinator was assigned from each department to speed up the implementation process and to liaise with the ERP project manager, consultants and department users. This encourages staff and department interactions in our organisation.*

In addition, E20, an IT consultant in a large military organisation, thinks that their organisational structure was helpful in enabling the ERP implementation:

> *Our top management made good use of the military structure and hierarchy, where orders are followed immediately. It is not flexible enough to allow for rewards or incentives for using the ERP or supporting inter-department communications.*

In contrast, E11, an IT manager who represents a governmental financial regulatory institution, believes that there is no need to make any changes to the structure in order to have a successful implementation:

> *A flexible structure is helpful, but the lack of this does not necessarily hinder implementation. In our organisation, we could not make any changes to the existing structure. However, we formed a steering committee from various departments and executives. Its role was to overlook and manage the implementation.*

Moreover, E25, an IT director in a telecommunications company, believes that the structure was actually hindering the implementation process by creating a separate unit for the ERP, outside of the IT department. This had created a communication problem and affected the integration of the ERP with other IT functions and their existing IT systems.

> *The ERP technical manager reports to the GM as a separate unit, while we have a dedicated IT department. This created a problem of integration of the ERP functions with our existing systems used for other functions. Issues of communication and cooperation were slowing the implementation process. This was resolved later by merging the two departments*.

To summarise the above findings, the structure of an organisation plays an important role in enabling and facilitating ERP implementation. Thus, to most organisations, it is not an obstacle, as some organisations have managed to acquire effective ERP abilities using their existing structure to enforce the implementation. In addition, other organisations employed and considered the implementation as a project-based model to overcome their structure issues.

6.3.9 Change management

The implementation of an ERP system is likely to produce widespread organisational changes, such as the redesign of business processes and patterns of work flow. In addition, ERP implementation changes the original power balance of key stakeholders, affects the benefits of vested groups, and requires followers to take on new job functions and responsibilities. The findings of this study found that most organisations have change management policies and change managers to effectively manage their organisation-wide change. One ERP manager (E21) in a government organisation views the role of the change manager as a facilitator, easing the implementation process by working with the most influential users and managers to support the implementation.

> *We have a change manager, whose job is to ensure the change is done in a smooth way; they work with the most influential users and managers to make sure they understand the system and support the implementation. They provide reports on the readiness of the organisation for each phase of the project. They work closely with influential key users and managers to make sure they buy into the system and support it.*

This is echoed by E11, an IT manager of a government regulatory organisation, emphasising that the role of a change manager is to ensure that ERP implementation is aligned with their change polices:

> *The role involves making sure that the implementation is aligned with our organisation's change polices. In addition, our change manager is in charge of our ERP training.*

In addition, raising ERP awareness among employees is another responsibility of change managers, as stated by E10, an ERP manager in a petrochemical company:

> *Our change manager was responsible for conducting ERP awareness campaigns prior to the go-live.*

To summarise, change management is seen as an essential element of the ERP implementation. The findings of this study show that most organisations have change management policies and change managers to manage their organisation-wide change. This reflects the importance of having change managers to oversee the policies and procedures of organisations regarding change management. In addition, they act as facilitators to ease the implementation process, raise awareness of ERP, and align the implementation with organisational change polices.

6.4 Key Factors Affecting the Adoption and Diffusion of ERP

This section aims at investigating the key innovation diffusion attributes identified by Rogers' (1985) study, as discussed in the literature review (Chapter Three). It investigates how the different organisations examined are managing their innovation adoption and diffusion. This study has identified the key factors required for the successful diffusion and implementation of an innovation such as ERP. These factors include relative advantage, compatibility, complexity, trialability and observability. These factors are investigated in the following sections.

6.4.1 Relative advantage

Rogers (1983: p. 13) defines relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes". It was found that most interviewed organisations have realised and observed the ERP advantages over their previous systems, regardless of what system they have in place, and whether it is a manual or legacy system. Almost all interviewees confirmed that ERP implementation is seen as being beneficial to users and organisations. Stakeholders (i.e. top management, department heads, users, etc.) are noticing the benefits of ERP in their daily work. Fifteen organisations were able to effectively use more than 60% of the ERP functions; this has led to the enhancement of their business performance. For instance, E15, an ERP manager in a large bank, claims that ERP has changed the way they do business. It helped them to apply cost-reduction policies, such as paperless processes, and provided the ability for some of their staff to work from either home or remote locations. This had a substantial positive impact on lowering their operational costs. He states:

> *One main goal in our organisation is to have a paperless policy for all our processes. Now, we are able to have some of our staff work directly from home. This has substantially reduced our operational costs, since fewer processes are needed to perform a task, and has also provided a substantial reduction on our overheads. Simply, ERP has changed the way we do business.*

This is also confirmed by E25, an IT director of a large communication company, who states that the use of an ERP system helped them to reduce the cost of having more physical buildings and offices for their employees. He states:

> *…we have employees that don't have any office and work 100% from their homes. This step has resulted in substantial savings for the company. We have fewer offices and buildings now, after implementing ERP.*

In addition, the findings also show that organisations have experienced an increased understanding of processes and procedures among staff and departments. E18, an IT director of a government tourism and hotel company states:

> *There is now a more common and mutual understanding of our processes and procedures among our staff and departments, unlike before the ERP implementation, where departments would sometimes work in isolation from other departments.*

He also added that ERP helped them to improve coordination and minimise interdepartmental conflict that arose from the lack of well-defined processes:

> *We were able to minimise the conflicts between departments that were resulting from the absence of known and well-defined processes and procedures.*

Moreover, improved organisational work and reduced human error represents another benefit, as revealed by E2, an IT director of a mid-size telecommunications company:

> *…the ERP has enhanced our efficiency and effectiveness in our administrative work and reduced human error.*

This is also confirmed by E20, an IT consultant in a military organisation:

> *Data entry redundancy and errors have been eliminated, since data are entered, checked and then used by various departments. Also, we are now able to provide very complex data in a swift manner, which could otherwise take a long time to produce and may have some errors in the process.*

The findings suggest that most organisations have realised and observed the advantages of the ERP system compared to their previous systems. Among these advantages are cost reduction, process time reduction, common and mutual understanding of processes and procedures among staff and departments, improving coordination and minimising interdepartmental conflict, enhancing efficiency and effectiveness in organisational work, and reduced human error. Therefore, the acknowledgement of the relative advantages of ERP could help to increase the rate of adoption of ERP. As already mentioned in the analysis of the motives, most managers and executives are aware and attempting to obtain the relative advantages that ERP can deliver. However, these benefits are not automatically gained. The acquisition of ERP needs to be supported by the development of appropriate capabilities and organisational changes which can facilitate a better compatibility between the innovation and the context in which it is being operated.

6.4.2 Compatibility

Rogers (1983: p. 11) explains compatibility as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters". The compatibility of an ERP system with business requirements is an important factor that affects the success of ERP adoption. It is, therefore, crucial that new ideas, techniques or processes embedded in ERP are compatible with the specificities and capabilities of businesses within the Saudi context.

The findings show that most organisations found the ERP system to be incompatible with their existing systems and the way they do business, since it is completely different from what they had been using prior to implementing the ERP system. For instance, E11, an IT manager who represents a governmental financial regulatory institution, which implemented Oracle ERP to replace their legacy system in 2010, believes that the ERP system represents a significant change. He states:

> *ERP is substantially different from what we had; now we have integrated process and functions, our HR policies and processes are now integrated with*

our finance and accounting department, which means more accurate and faster processes, transactions and operations.

This is echoed by E1, an IT consultant:

ERP represents a radical change for all our business processes.

In addition, E20, an IT consultant in a large military organisation, thinks that ERP was faced with resistance as a result of being different from what users are familiar with. He states:

…a downside of our culture is that most of our employees are military personnel, who favour working in the field rather than an office, and physical work attracts them more. Technology is not something they favour or are accustomed to using. This demanded greater efforts in training and organisation-wide technology awareness…

In addition, ERP may create major changes to the job descriptions for some users and, perhaps, might result in a loss of jobs as a result of the incompatibility of the ERP. For instance, E19, an IT VP in a large retail organisation, states:

Non-Saudi users saw the ERP as a threat to their jobs; any automation attempt could mean, to them, that there is a big chance of not having a renewed work contract once their term comes to an end. Therefore, resistance was very strong and took different forms, such as giving inaccurate process requests or information to the implementing teams, asking for changes in the system that were not possible or delayed implementation, and complaining about the system with the hope that the project would fail.

To summarise, most organisations interviewed found that ERP is incompatible with their existing systems and the way they do business. In addition, ERP is seen as a radical change to their existing processes. It also may create major changes in job descriptions and even result in the loss of jobs, as a result of the incompatibility of the ERP. This, however, does not include organisations that already had an old ERP system in place (e.g. O10, O16, O19, O20 and O3).

6.4.3 Complexity

Simple ideas that are easy to understand may present the opportunity for rapid implementation and better compatibility, while a more complex innovation that requires new skills and understanding may lead to complex implementation, and increased risk and uncertainty (Jones and Saad, 2003). The findings show that almost all interviewees describe the ERP system as a complex system to understand, implement and manage. For instance, E3, an IT manager in a small real estate company, pointed out the top management's lack of understanding of ERP. He states:

> *Some managers did not have enough knowledge regarding the existing processes and procedures in place, nor did they understand or show awareness of what ERP could bring to their function.*

This is also supported by E5, an ERP project manager, stating that:

> *ERP has far more services than managers and end-users had imagined; this caused some ongoing changes to the current process and ERP customisation as well. This kept changing as managers and users became familiar with ERP.*

In addition, E6, an IT manager in a manufacturing company that used the phased strategy and the middle-road method, confirmed the complexity of the ERP by stating that his organisation actually cancelled some modules during the implementation, in order to gain more control over the budget. As a result of the complexity of the ERP implementation, they went over-budget. E6 states:

> *We had to reduce the scope of the ERP system, as top management decided not to implement some modules in order to control the implementation budget, which was increasing in both time and cost… we finished the implementation project with an increase of over 15% of the implementation time and over 10% on cost.*

In summary, it was found that most organisations interviewed found the ERP system complex to understand and implement, and as a result, difficult to use. Therefore, this complexity of ERP as seen by the interviewed organisations could decrease the rate of adoption of ERP and would suggest the difficulty to easily obtain most of the expected benefits identified by the interviewed managers.

6.4.4 Trialability

If organisations try the system before implementation, this would, to some extent, ensure a smooth and successful implementation, where any risk is anticipated and addressed. Rogers (1985: p. 13) states that trialability is "the degree to which an innovation may be experimented with on a limited basis". Therefore, users trying the ERP package prior to actually implementing it helps not only in familiarising users with the how the system works, but could reduce users' resistance and encourage their cooperation.

The findings suggest that trying an ERP system before purchasing it is not a common practice, since it requires an enormous level of preparation to design the system to be something to which users can relate in each potential organisation. However, vendors sometimes make presentations, which in some cases include a general demonstration of the main ERP functions. None of the Saudi organisations interviewed actually tried the system before deciding to purchase it, while almost all organisations had their key users and/or their IT staff attend vendors' presentations prior to buying a system. For instance, one ERP manager, E10, an ERP manager in a petrochemical company, stated that their key users attended their vendor's presentation before buying the system. Their vendor showed them some of the basic ERP functions to help them make sense of ERP usability:

> *Key users where shown something called PoC, "proof of concept", which shows users some basic functions and some of the ERP capabilities. This, of course, does not cover everything; however, it helps users make sense of ERP usability.*

This shows that organisations, in general, consider ERP to be a simple IT "gadget" and hardware that can easily be adopted and used. Moreover, in most cases, the decision to acquire the ERP system was essentially related to the vendor's presentation. This also indicates that there is a lack of awareness regarding the complexity and the key organisational and learning factors needed for the successful implementation of ERP. Therefore, this clearly impedes the successful implementation a rate in Saudi organisations.

6.4.5 Observability

Rogers (1983: p. 15) defines observability as "the degree to which the results of an innovation are visible to others". The results of this study found that most organisations are well aware of ERP system use in their industry and in general, since employees may come from organisations that have already implemented an ERP system, and have been exposed to the system and its benefits. For instance, E18, an IT director of a government tourism and hotel company, states that the majority of their staff had previous experience of ERP systems:

> *We have a mix of different professional backgrounds. Around 75% of employees come from organisations where they were exposed to the ERP system.*

Moreover, users are acknowledging the ERP benefits. For instance, E15, an ERP manager in a large bank, stated that users are noticing the benefits provided by ERP:

> *ERP helped us in many ways, one of which is that now we can do things better and faster. For instance, if someone needs to apply for a holiday, it only takes 30 minutes, instead of two weeks, as before the ERP implementation. Our process is much faster now.*

Therefore, organisations are aware of ERP use in their industries. Moreover, users are also seeing the benefits of ERP. This could help in increasing the rate of adoption of ERP.

To summarise, the findings suggest that most organisations have realised and seen the advantages of the ERP system compared to their previous systems. Furthermore, organisations are aware of ERP use in their industries. In addition, users in these organisations are also witnessing the benefits of ERP. The findings also suggest that trying the ERP system before purchasing it is not a common practice, since it requires an enormous level of preparation to design the system to be something to which users can relate in each potential organisation. Additionally, most organisations found that ERP is incompatible with their existing systems and the way they do business. Thus, ERP is seen as a radical change to their existing processes. It was revealed that most organisations interviewed found the ERP system to be complex to understand and implement, and therefore difficult to use. It also suggests that most organisations are benefiting from the use of ERP but are certainly not gaining the full benefits that this innovation can deliver.

6.5 Key Factors Affecting ERP's Learning and Knowledge Sharing

This section is aimed at investigating the key factors affecting ERP's learning and knowledge sharing in the sample organisations. It investigates how the different organisations examined are managing learning and knowledge sharing to support ERP implementation. This study found ten learning and knowledge sharing factors affecting the implementation of an innovation such as ERP. These factors include understanding, adapting and effectively using the ERP functions, learning and development, managerial commitment and support, openness and experimentation, having a clear vision and strategy for ERP learning, existing and accumulative knowledge, discussing problems and errors, documentation of knowledge gained, process and structure to capture new ideas, and external linkage with other organisations. These factors are investigated in the following sections.

6.5.1 Understanding, adapting and effectively using the ERP functions

Understanding, adapting and effectively using the ERP functions would enable organisations to make good use of the system and improve its functionality. Organisations usually encounter some level of difficulty in understanding, adopting and using these systems, due to the complexity of the systems. Therefore, it is suggested that organisations with better learning and knowledge management would have a higher level of understanding level than others.

The findings suggest a number of factors that could result in higher ERP abilities. The most important factor is ERP training, along with having experienced and knowledgeable IT staff on board, having young and new staff, being a newly established organisation, and having an old ERP system in place. Interviewees were asked to rank their organisation's abilities to understand, to adapt the ERP functions to be aligned with their business, and to use the ERP functions. They were also asked to outline the measures and steps that helped them to achieve these abilities. Most organisations' representatives, when asked to rank their understanding of the ERP system from one to five (where five is the highest and one the lowest), chose to rank their abilities from three to five. None of the interviewees scored their organisation lower than three in any of those abilities (Figure 6.17).

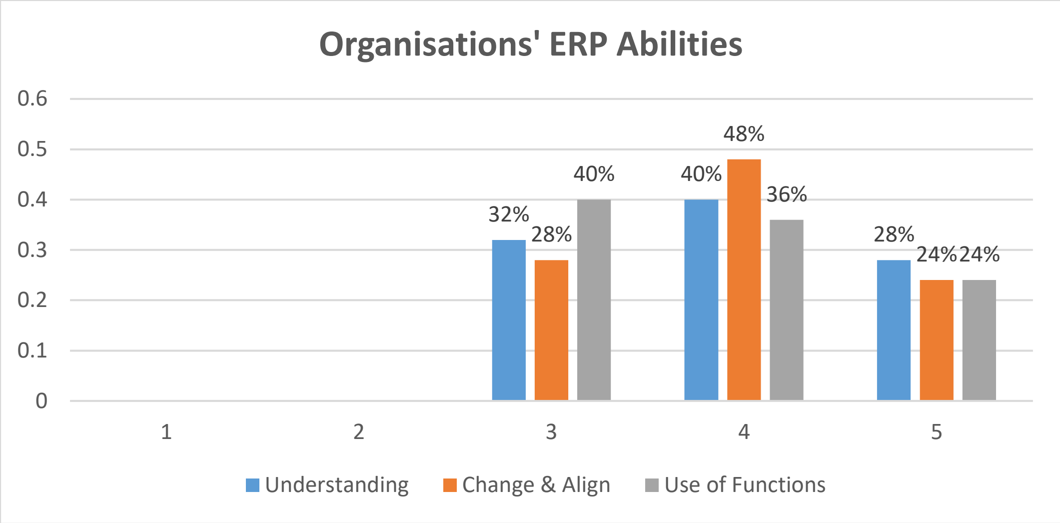


Figure 6.17: Organisations' abilities to understand, adapt and use the ERP system

Only seven interviewees thought they had reached a high level of understanding the ERP functions in their organisations (where users are able to understand all functions and suggest new changes and functions). Six Interviewees claimed that their organisation showed a high level of adapting ERP functions to achieve better business alignment. Interviewees representing six organisations thought they had displayed a high level of efficiency in using ERP functions to enhance business performance. Moreover, some of these organisations have scored highly in more than one aspect. Only two of these organisations exhibited a high level in all abilities (O12 and O16). It was also found that fourteen of these organisations are governmental organisations working in the following sectors: telecommunications and IT (O22), hotels and tourism (O18), education (O12), banks and financial services (O17), and military (O20). The remaining eleven organisations are private organisations in real estate (O3), banking (O24), telecommunications and IT (O25, O1) and industrial sectors (O16, O10). Although sixteen of these organisations had changed their implementation scope during the implementation, they managed to show higher abilities of understanding, adapting and using the ERP functions, according to the interviewees. Additionally, eleven organisations who scored highly in these abilities have employed different ERP implementation methods and strategies. They have also have used different learning strategies and methods.

Furthermore, it was found that fourteen organisations ranked their understanding, adaption and use of ERP functions at three out of five. These organisations are from different sectors and industries, and used different strategies and methods in implementing ERP. In addition, thirteen of these organisations used the vanilla method to implement ERP, while the middle-road method was used by only eight organisations. Therefore, it can be concluded that the type of strategy or method for implementing ERP has no effect on their ability to understand, adopt and use ERP. Since organisations that have ranked their ability to understand, adopt and use ERP both high and low, they displayed a mix of ERP implementation and learning strategies and methods.

The findings also show that most interviewees attributed high ERP ability levels to a number of factors. For instance, all interviewees agreed that ERP training is the most crucial factor in increasing their ERP abilities. According to E16, an IT director of one of the largest petrochemical companies in the world, providing different types of training according to the staff relations with ERP helped them to better understand and use ERP functions:

> *Training users to understand and use ERP better, training key users to participate in our process re-engineering, and specialised training for our ERP developers have all resulted in better use of the overall ERP functions.*

Another factor that may have helped seven of these organisations was the existence of an old ERP system prior to making the upgrade to the new ERP system. Therefore, helpful prior knowledge was possessed, and the whole organisation was already familiar with the system. One IT director, E16, states:

> *…staff are already familiar with ERP systems; this helped us a great deal in communicating with users with regard to the new upgraded system. For instance, our users already know their processes, tasks and functions.*

In addition, seven of these organisations were relatively new, using manual systems, and at the starting phase when they initiated the ERP project, which means that they had no well-established processes to be changed. This could ease users’ resistance to some extent.

E25, an IT director in a newly established telecommunications company, states:

> *…we were a relatively new organisation with a small number of staff and working manually… we had no established processes that made our employees*

resist the implementation… on the contrary, they were very supportive and willing to use and develop more ERP functions.

Moreover, having young and new staff also seems to be helpful to these organisations, with younger staff having a higher adaptability rate than others who are older (E17). It was also helpful to employ new staff who had been exposed to ERP systems prior to joining these organisations, who were just starting their businesses. E12, an IT vice president in a government educational organisation, stressed that having young staff helped his organisation to master ERP faster and more effectively:

We have relatively young staff and most of them come from organisations where they had used an ERP system before; therefore, we had a good understanding of the system before we started the implementation process. This made our training more effective.

Furthermore, having experienced and knowledgeable IT staff on board is highlighted by nine interviewees. The importance of existing prior knowledge is vital to building ERP capabilities to understand, adapt, develop and use the ERP functions. E17, a CIO of a banking and financial regulatory government organisation, believes that they have very well-qualified IT staff, who are already Oracle certified consultants, capable of making any changes they need in terms of customisation and process design.

Most of our IT staff are Oracle certified consultants. We built a team that has good ERP capabilities. This helped us to make correct decisions in customising ERP and performing our business process re-engineering to have the optimum system that is capable of handling our business needs.

From the above analysis, it is apparent that, despite the fact that the majority of organisations encourage the learning and development of users (as concluded in the previous section), not all organisations have achieved high scores in understanding, adapting and using ERP. Moreover, it was found that although organisations use different ERP implementation strategies and methods, they have no major effect on their ERP abilities. In addition, the findings suggest a number of factors that could have resulted in higher ERP abilities. The most important factor is ERP training, followed by having experienced and knowledgeable IT staff on board, having young and new staff, being a newly established organisation, and having an old ERP system in place. However, the development of an appropriate level of knowledge base, which is a key condition for the successful implementation of innovations such as ERP, is clearly not being given the adequate priority.

Appendix 8 provides a summary of strategies and methods used and organisations' abilities in using ERP systems.

6.5.2 Learning and development strategies and methods

The findings of this study show that there is a strong consensus among interviewees on the importance of training. The interview findings suggest that organisations are using multiple methods as learning strategies to acquire knowledge and enhance employees' skills. The acquisition of knowledge needs to be disseminated among the employees of organisations, not only to strengthen their understanding of the acquired knowledge, but to foster a learning culture within these organisations. The selection of learning methodologies and strategies by organisations is crucial to ensuring the effectiveness of the knowledge acquisition and transfer. The interviews findings show that numerous reasons were considered when choosing learning methodologies and strategies. Amongst these reasons considered were the different ages and generations of trainees, the availability of IT resources and tools, the learning resources within the organisation, the affordability of training and budgetary support, and the nature of the business and mode of operation. The organisation's objective is to achieve the best possible impact from learning and knowledge acquisition for the benefit of the organisation and the ERP implementation, as explained below by E22, an IT director in a large government telecommunications organisation, stressing the importance of using learning effectively, regardless of the strategy or method used to save time and money. He states:

> *The learning strategy depends heavily on the maturity and smartness of the organisation. Yet, the selection of the right learning strategy and method is still crucial. It is crucial mainly in achieving the fastest, easiest and cheapest way to conduct the learning strategy for our organisation.*

The findings show that organisations used different strategies and in some cases combined methodologies to train their users (Table 6.4). Training courses both online and conventional, workshops, online manuals, email circulations and internal social networks were the main tools and learning aids that helped organisations to understand the ERP functions. The findings show that there were four main learning strategies used, and these can be classified as internal, external, formal and informal strategies. A summary of the methodologies and strategies used are presented in Table 6.2, and discussed below.

Table 6.2 Learning strategies and methodologies used in Saudi organisations

S/N	Methodologies used	Frequency
1	Classrooms	21
2	Workshops	11
3	Experiential learning	6
4	Online manuals, email circulations and internal social networks	18
5	On-the-job training	12
6	Group discussion through meetings	9
7	Self-learning	5
8	External linkage with other organisations	3
9	Problem-solving through meeting to discuss problems	4
10	Education programme	3
11	Seminars and conferences	4
12	Coaching and mentoring	15
13	Peers: key users training	12

The interviewees revealed twelve learning methodologies practised either singularly or simultaneously. The single methodologies were usually education programmes, either in the classroom or as on-the-job training. On the other hand, the combined methodologies included online access to materials, coaching and mentoring, group discussions through meetings, self-learning, workshops, seminars and conferences, experiential learning, meetings, problem-solving through meetings, external linkage with other organisations, and key users training.

Moreover, the findings suggest (Table 6.4) that the most popular methods were classroom teaching (21 organisations), online manuals (18), and coaching and mentoring (15). These three methodologies are referred to as multi-source methods, since they draw on various sources of learning, such as reading, research, books, magazines, journals, publications, resource centres and others. In addition, the findings also suggest that online learning (18), via the internet and emails, has become a popular learning methodology. These findings reflect the Saudi Arabian government's positive and pro-active approach in encouraging Saudis to use information technology to enrich their knowledge. The next most popular learning methods were on-the-job training (12), peers and key users training (12), and workshops (11). The findings also reveal that internal learning (17), taking place within the organisation, is more popular than training conducted in other locations (8). The choice of formal (21) and informal (18) learning strategies showed that both strategies are popular means of knowledge acquisition, with formal learning that is conducted through education programmes and classrooms being slightly more preferred over informal learning, which is done through various methods, as shown in the table above.

To foster and enable learning regarding ERP, organisations have taken different steps and measures. The majority of organisations (18) have at least one of these tools available to their users: online support, online training manuals, videos, ERP websites, internal social media to improve communications, and online knowledge bases. Additionally, ten organisations either had ERP departments, or established them. In addition, some organisations (4 out of 25) hired new executives with ERP experience, while two organisations started ERP campaigns long before the implementation project. E18, an IT director of a government tourism and hotel company, states:

> *We started campaigning about ERP six months before we actually started the implementation. This campaign was done through the use of workshops, presentations, email circulation, and a number of talks by our chief board of directors and our CEO, addressing all users as part of raising their awareness of ERP, and encouraging them to use it.*

Furthermore, it was discovered that there are different training providers. Training is offered either by one provider (e.g. a vendor, IT department or external consultants) or jointly with other providers. In the majority of organisations (20 out of 25), training was offered by vendors either solely or jointly. For instance, E14, CIO in a telecommunications company, states:

> *Training was offered by our vendor, due to the fact that vendors are well aware of their system.*

In addition, ten organisations had their IT departments train their users. Project managers were in charge of 20% of the training. External consultants presenting training accounted for 16% of the total training offered.

These training efforts targeted different ERP stakeholders. Twenty one of the interviewees reported that all users have been subject to some kind of training. E13, an ERP project manager who works in one of the largest semi-government hospitals in Saudi Arabia, confirmed the importance of having a general training strategy, where all employees receive training at least once a year, helping them to achieve a high level of understanding and using ERP:

> *We have a training strategy where almost all employees should have at least one training course each year. Training should be either in his/her field of work or in other disciplines.*

According to the interviewees, five organisations trained their department heads in order to gain their support for ERP implementation, hence easing the process of re-engineering tasks in their departments. In addition, fifteen organisations had trained their key users for the purpose of becoming trainers themselves, in order to train the other users. One explanation for training key users, as mentioned by E13, IT director of a large semi-government hospital, is to train them in order that they can train other users with specialised courses designed for this purpose:

> *We sent department heads and key users to London, UK for three weeks. Some of the key users were asked to train the rest of the users through a training programme we called 'train the trainer'. This method of training helped us to educate users and teach them how to use the ERP system in their daily tasks. We trained nurses and doctors to train other nurses and doctors, as they would be the best people to understand the process and, therefore, could communicate easily with their colleagues.*

E24, CIO of a commercial bank, supported the use of key users as trainers and stated:

> *We have workshops to train the trainers, where users are trained to train other users.*

With regard to the duration of training, it was found that the majority of organisations (16), had only one week of conventional training classes to train their users, while six organisations had two weeks, four had three weeks and one organisation, had over three months of training. Thus, most of these organisations had ongoing online training. Over eighteen of these organisations had some online courses, videos and manuals available to users to learn as needed and when needed.

The findings also display that almost all of the organisations had some kind of training for their users. This training varies from basic to very advanced training. The basic training aimed to raise users' awareness regarding the ERP system. This type of training was used by seven organisations, including an introduction on what ERP is, its benefits, and how it can help to improve business. In addition, sixteen organisations had training that focused on users effectively using the ERP system. There is, however, evidence of advanced training within a few organisations (5), offering more in-depth training which focused on process re-engineering and new function development. According to E16, an IT director of one of the largest petrochemical companies in the world, all their employees have received training regarding ERP; this included user training. All ERP users were trained, for instance, to perform their daily tasks on ERP, while key users had more extensive training to become ERP trainers, allowing them to train other users. E16 states:

> *All employees have specialised training courses on how to use ERP, while key users have full training in order to prepare them to be ready to train other users.*

Training took place in different implementation phases. Most organisations started their training programmes after starting the ERP project (17). These organisations had only trained their users during the actual implementation, educating users about the new changes to processes, and the new functions that needed to be used. Only four of organisations started their training programmes prior to the beginning of the ERP implementation, aiming to raise organisational awareness of ERP benefits in order to have top managers and key users support the implementation. This is confirmed by E16, an IT director of one of the largest petrochemical companies in the world, stating:

> *Prior to launching the ERP project, department managers participated in a training course about business process re-engineering, and how they can make the most out of the ERP system to help them in their duties.*

Regarding post-implementation training, its objective is essentially to encourage process improvement and further develop functions, which could help the organisation utilise the ERP system to acquire more tools and subsequently improve the organisation's performance. This type of training was used by only five organisations. In addition, only three organisations used continuous training activities during all phases.

To summarise, the results of this study show that there is a strong consensus among interviewees on the importance of learning and training in particular. In addition, the findings indicate that organisations have taken a variety of measures to foster and encourage learning and knowledge sharing regarding the implementation and use of the ERP system. They have utilised different learning strategies, methods, providers, locations, durations, subjects, beneficiaries and different implementation phases to encourage the learning and development of users. Gavin that all of the interviewed organisations believe they have scored no less than 3 out of 5 in their ERP abilities levels in understanding adopting and using the ERP system, training efforts have increased their organisational learning and absorptive capacity levels. The training and learning efforts have been captured by the whole organisation and not just at the individual level.

6.5.3 Managerial commitment and support

Top management's commitment and support for learning represents a crucial factor in ERP implementation. The findings of this study show that management commitment and support are important in encouraging and supporting the ERP implementation. For instance, E1, an IT consultant states:

> *Top management were encouraging and supporting the project to start, encouraging employees to try and use the system, and continued to ask for more enhancements and development of the project.*

E20, an IT consultant in a large military organisation, confirms this:

> *Top management's role was to support the overall implementation and solve problems. Top management support made the implementation succeed.*

In addition, top management were monitoring the progress of the project. E11, an IT manager of a government regulatory organisation, states:

> *We would meet weekly to review the project plan, listen to problems and potential risks that could hinder the project, and also supported the project teams.*

Moreover, top management acting as a project sponsor/champion is mentioned by E16, an experienced IT director in one of the largest petrochemical organisations in the world:

> *Our CEO is the ERP project champion; he was engaged with the project from the start, provided great support to the implementation team, and reviewed progress weekly. He was very keen to go live on time, and to do that he intervenes periodically and makes sure that there are no problems or conflicts in this regard.*

Forming and heading steering committees for the ERP project is another role of top management. This is mentioned by one ERP manager (E21) in a government organisation:

> *Top management, through the steering committee, helped, especially when there was a conflict or when departments requested something that was not practical or had a great impact on other unit or the business itself. They meet monthly to make sure the project is going as planned, and provide the necessary support.*

In summary, top management's commitment and support was found to be an important factor for the success of understanding, adopting and using the ERP system. The findings show that management was supporting ERP learning by monitoring progress, acting as a project sponsor/champion for the ERP project, encouraging and supporting employees to use the system, and holding meetings to solve problems related to the implementation. Therefore, the findings of this study show that management commitment and support are important factor in encouraging and supporting the ERP implementation

6.5.4 Openness and experimentation

This section investigates the importance and impact of openness to new ideas regarding the implementation of ERP. Based on the empirical data, openness to new ideas and suggestions, along with encouraging users to explore ERP, is considered to be one of the enablers supporting the successful implementation of ERP.

The findings from the interviews show that most organisations (18 out of 25) are open to new ideas and suggestions, and encourage their users to explore ERP in order to better understand, adapt and use the system. For instance, in the case of O16, its approach to new ideas and staff encouragement seems to be reflected by its success and high ERP abilities. It scores highly in understanding, adapting, changing and using the ERP functions. This organisation also encouraged training throughout the implementation project phases. E16, an experienced IT director, confirms that their board of directors and top management are both open to new ideas and encourage users to attempt to use the system.

> *Both the board of directors and top management are welcoming ideas and suggestions to improve ERP use. Users were encouraged to use ERP and try new functions.*

In supporting this, E1, an IT consultant in a telecommunications and IT company, confirms that their top management were encouraging and supporting the ERP project. He states:

> *Top management encouraged and supported the project to start, encouraged employees to try and use the system, and continued to ask for more enhancements and development of the project.*

Openness requires a structure that encourages new ideas and embraces innovations such as ERP systems. There is evidence that organisations from the selected sample have employed more than one method or tool to allow a smooth flow of ideas. For instance, O25, a newly established telecommunications company with good ERP abilities, has developed an internal website to allow employees to freely discuss new ideas and propose enhancements to the ERP system. In addition, they had a dedicated bulletin discussion board, ticketing system for technical support, and company private social media.

E25, an IT director in this organisation, states:

> *We have employed a number of tools to capture users' ideas and suggestions, and to discuss possible improvements or issues, including the ERP system. These tools include a dedicated bulletin discussion board, ticketing system for technical support, and the company's private social media. Employees are free to express their concerns regarding any issue or suggest new services or improvements. All our top management, from the CEO to department heads, are taking this policy seriously, and they interact with employees to support their ideas or solve issues they may have.*

Other organisations, in believing the importance of capturing new ideas and encouraging suggestions for development, have established an innovation department to oversee and manage innovations. For instance, E1, an IT consultant in a telecommunications and IT company, states:

> *We have an innovation department that encourages employees to present their ideas and suggestions for improvement.*

E17, a CIO of a banking and financial regulatory government organisation, stated that their chairman and board of directors are very supportive of new ideas, and they have an organisation-wide policy regarding IT improvement to encourage the use and enhancement of ERP:

> *We have an organisational policy regarding IT improvement ideas; this policy is supported by our chairman and board of directors. Simply, users can use our private internet portal to suggest new ideas or improvements for any IT-related issues or functions, then we review them, and if they are worthy and feasible, we take action to implement them. This has encouraged ERP users to explore the system and suggest improvements.*

Furthermore, encouraging employees to participate in the organisation's decision-making process, through holding regular meetings to discuss problems and issues related to the implementation, is commonplace. For instance, E21, ERP project manager, stated that they have weekly meetings with users to discuss and solve system issues and problems:

We had weekly meetings with key users to discuss changes. These meetings proved to be very helpful to address their needs and any issues they have with ERP.

On the other hand, other organisations are not open to new ideas and suggestions, and do not encourage users to explore ERP. The notion of new ideas for existing policies and procedures can be attributed to helping and encouraging employees to come forward with their new ideas. O1, a telecommunications and IT industry organisation with a low level of ERP abilities with regard to understanding, adapting, changing and using the ERP functions, is not open to new ideas, nor does it encourage users to explore and experiment with the system. Some of their polices are preventing the easy flow of new ideas, and as a result, they had no improvement suggestions to enhance the use of the ERP system. E1, an IT consultant of this organisation, claims:

Our organisation suffers from politics, preventing the smooth flow of ideas and improvement suggestions. ERP is no exception in this case. Therefore, users barely perform their required tasks in using the ERP system.

In addition, organisations that have no process and structure to capture new ideas, or a limited process and structure, may suffer limitations with regard to capturing a wide range of ideas from employees of different levels and positions. For instance, O9, a mid-size transportation company, used only formal meetings to discuss ERP issues, which means idea flow was limited to the purpose of the meeting. E9, an ERP manager in this organisation, states:

All ERP issues and concerns are discussed only with department heads and the ERP project teams… users are not involved in any discussion.

E22, an IT director in a large government telecommunications organisation, stated that although his organisation is open and encourages users to try the system, users are scarcely able to perform their daily tasks

We encourage users to explore the system; however, usually users are overwhelmed by the amount of work they must do on a daily basis. I believe

> *that once users become fully familiar with the system, they can suggest improvements. However, we are not there yet.*

Based on the above findings, the openness to new ideas and suggestions and the encouragement of users to explore ERP are considered by most organisations to represent one of the enablers to support the successful implementation of ERP. The findings show that organisations lacking good policies to encourage new ideas and suggestions and encourage users to explore ERP may suffer difficulties and limitations in their abilities to understand, adapt, change and use the ERP functions. The findings also show that in order to capture new ideas and ERP improvement suggestions, some organisations have employed strategies and tools. These tools include dedicated bulletin discussion boards, ticketing systems for technical support, and company private social media. Other organisations have established an innovation department to oversee and manage innovations.

6.5.5 Clear vision and strategy for ERP learning

Objectives, goals and a mission communicate the operational direction of the ERP project to the project team. The findings reveal that the majority of organisations interviewed (16) do not have a clear and written ERP strategy, and a clear vision and objectives for the implementation. The remaining nine organisations either have a clear ERP strategy or they follow some general IT frameworks. For instance, one government organisation (O20) has a long-term IT strategy, and follows this strategy for all its IT work, including the ERP system. The organisation's ERP manager (E21) stated:

> *We have a ten-year strategy for all our IT projects. This also includes clear goals and objectives for implementing any innovative solutions or services. As a very large organisation, this helped us to reduce ERP resistance, have a clear ERP implementation direction, and align our training efforts, so our staff became ready for change.*

Other organisations such as O1 do not have their own strategy, and follow the Information Technology Infrastructure Library (ITIL) framework. This is a set of best practices to achieve quality service and overcome difficulties associated with the growth of IT systems. E17, a CIO of a banking and financial regulatory government organisation, states:

> *We do not have any written strategy, except the general strategy – nothing for IT projects or any innovative solutions. However, we follow the guidelines of the Information Technology Infrastructure Library (ITIL) strategy in our IT implementations.*

One IT director in a large company (E16) indicates that his organisation have a general understanding of technology adoption strategy, but nothing for ERP in particular. However, it is not formally written:

> *Our general strategy concerns the need to keep up with new technology; however, this policy is not written.*

E22, an IT director in a large government telecommunications organisation, confirmed that they do have an ERP strategy:

> *We do have a written strategy for the ERP implementation, but not for any other projects.*

Alternatively, a lack of a clear vision and ERP learning strategy may result in gaining fewer benefits from ERP. E6, an IT manager in a manufacturing company, states:

> *When we were assessing department needs in designing the ERP system, a noticeable number of users asked to have the ERP do what they normally do in their manual system, disregarding the objectives and goals of having ERP in the first place, which involve automation and integration in order to have better processes.*

In conclusion, organisations that have a clear ERP and IT learning strategy are well aware of the importance of having common goals and objectives that are shared organisation-wide. However, only nine of interviewed organisations have learning strategies, while the majority of organisations did not have any strategy for their IT-related implementations. This can add to the difficulties to implementing ERP which success strongly depends on a clear learning strategy aimed at enabling the organisation to successfully benefit from such an innovation.

6.5.6 Existing and accumulative ERP knowledge

ERP implementation is an evolving process; learning from the ERP solution experience may affect future management decisions, too (Law *et al.*, 2010). The findings suggest that there is a consensus among the interviewees (21 out of 25) regarding the matter of accumulated knowledge helping them during the implementation of ERP. Prior ERP implementation experience, top management IT experience, and skilled ERP users are found to be helpful in more effectively understanding, adopting and using the ERP system. In addition, the findings show that having experienced and knowledgeable IT staff on board is highlighted by nine organisations with high ERP ability levels, as presented in earlier sections. The importance of existing prior knowledge is vital in building ERP capabilities to understand, adapt, develop and use the ERP functions. For instance, E17, a CIO of a banking and financial regulatory government organisation, believes that they have strong, qualified IT staff who are already Oracle certified consultants, capable of making any changes required in terms of customisation and process design:

> *Most of our IT staff are Oracle certified consultants. We built a team with good ERP capabilities. This helped us to make correct decisions in customising the ERP and performing our business process re-engineering to have the optimum system, capable of handling our business needs.*

E17's above argument is also supported by having high ERP abilities in understanding, adapting, changing and using the ERP functions. Therefore, the use of well-qualified and knowledgeable IT staff increased the success of the implementation.

In addition, seven organisations possessing high ERP ability levels found that having an old ERP system in place was helpful to the new implementation. Therefore, useful prior knowledge existed, and the whole organisation was already familiar with the system. One IT director, E16, states:

> *…staff are already familiar with ERP systems; this helped us a great deal in communicating with users with regard to the new upgraded system. For instance, our users already know their processes, tasks and functions.*

Furthermore, E1, an IT consultant in a telecommunications and IT company, felt that the high level of accounting and IT experience possessed by their staff helped the company to redesign their processes and customise ERP to fit smoothly with their business needs. In addition, IT department staff having strong technical knowledge of ERP systems was found helpful in achieving the necessary alignment of existing businesses processes and ERP systems.

> *Having good, experienced staff on the system in accounting and IT enabled us to have good customisation and process re-engineering.*

This view was echoed by the manager of E24, who stressed the importance of team capabilities, experience and IT skills as enablers for business alignment:

> *Our IT team's capabilities, experience and skills helped us to customise the system to suit our needs.*

Having young and new staff also seems to be helpful to some organisations, with younger staff having a higher adaptability rate than older colleagues. E18, an IT director of a government tourism and hotel company, attributed their high levels of ERP abilities to having young staff, who had been previously exposed to a dynamic business environment with ERP in place. These young members of staff were already familiar with the ERP functions, and had been exposed to the benefits that ERP provides to organisations.

> *We have relatively young staff, and most of them come from organisations where they had used the ERP system before; therefore, we had a good understanding of the system before we started the implementation process. This made our training more effective.*

To summarise, existing and accumulative knowledge was found to be an important factor that enabled organisations' successful implementation of ERP. In addition, it was found helpful in better understanding, adapting and using ERP functions.

6.5.7 Discussing problems and errors

Discussing and solving problems can create new and innovative ideas if organisations are able to provide an environment where problems and issues are discussed freely and creatively.

Findings show that providing an open environment free of criticism and ridicule increases the ability to think freely, which could have a positive impact on learning and knowledge sharing within the ERP implementation. The majority of organisations often hold regular meetings to discuss problems and issues related to the implementation. The purpose of these meetings is documenting and resolving any problem that may have an impact on ERP implementation. For instance, E11, an IT manager, states:

> *Errors and failure are always discussed and analysed freely though our regular weekly meetings with top management. During these meetings our top management listen to problems and potential risks that could hinder the project, and support the project teams.*

This is also mentioned by E20, an IT consultant in a large military organisation, claiming that his organisation not only encourages communication, but also forces it to take place. He states:

> *Our ERP project sponsor, who was the second-highest ranking officer in our organisation, encourages and sometimes forces communication to solve issues and problems.*

On the other hand, other organisations have had some difficulties in the way problems and concerns regarding ERP are discussed. For instance:

> *Usually, when we have any issue or problem that concerns two or more departments, we just report that to our top management and they make the decision. For example, if we need to change a certain process that owned by one department and might affect other departments, there will be no discussion between these departments. Instead, top management will intervene and force the decision. Our top management do not welcome any discussions that lead to disagreement, thus they do not allow such discussions.*

To conclude, creating a friendly environment, where problems and issues related to ERP are discussed freely is viewed as an important factor, which encourages learning and knowledge sharing, and consequently enhances the implementation process.

6.5.8 Documentation of knowledge gained

The implementation problems and other previous experiences of similar or related projects, whether successful or not, need to be documented, and hence codified. This, in turn, contributes to the improvement of absorptive capacity and the development of organisational, which as suggested in the literature review, form the basis for the successful implementation of innovations such as ERP. This collective form of learning helps to enhance success in similar projects and avoid repeating mistakes.

The findings show that most organisations acknowledged the importance of keeping records for the implementation problems they encountered during the implementation project. According to interviewees, seventeen organisations used the ticketing system for reporting problems or change requests during the implementation phase. These tickets are handled by their technical support teams, where problems are sorted and then solved. For instance, an IT director of a government tourism and hotel company (E18) stated:

> *We have a dedicated ERP online ticketing system to report any problems or issues that are related to implementation. Users can report any problem they encounter and can make a request for any necessary change to the system. Our IT staff will handle these tickets to solve these problems and change requests.*

E1, an IT consultant in a telecommunications and IT company, echoed and supported this:

> *All problems that we faced during the implementation were recorded and sorted every week by our technical support team. In the case of a problem that cannot be handled by the team, a report is then prepared in order for top management to take action.*

Moreover, five organisations prepared an ERP implementation reference manual. They documented the knowledge gained from ERP implementation to be used in future ERP implementations and upgrades. For instance, E5, an ERP project manager who works in one of the largest semi-government hospitals, stated:

Lessons learned and special milestones, along with the implementation phases and process, are put together in a special manual to use as a reference for future IT implementation in general, and ERP upgrades in particular.

The findings also show that some organisations (14) anticipated some of the problems they could encounter during the implementation phase, and made plans to overcome these issues. For instance, an IT director (E16) in a large petrochemical company stated that during the planning phase they listed the possible problems they could encounter during the implementation phase, and discussed these problems with related departments:

During the planning phase we listed a number of potential issues that could arise during the implementation. These issues were discussed with department heads, as they would have to deal with these issues.

E20, an IT consultant in a large military organisation, added that project managers prepared detailed plans, including problems that they could potentially encounter:

Our project managers prepared detailed plans, including potential problems. Then we prepared the technical support team to deal with these issues.

E10, an ERP project manager working in a petrochemical organisation confirmed that, stating:

Any expected problems were detailed on the risk log, and were mitigated accordingly.

In summary, the documentation of the implementation was found to be an important factor which enabled organisations' successful implementation of ERP. Most organisations that documented their implementation plans and anticipated problems had better ERP abilities in understanding, adapting and using ERP functions.

6.5.9 Process and structure to capture new ideas

This section investigates the importance and impact of openness to new ideas on the implementation of ERP. Openness requires a structure that encourages new ideas and embraces new innovations. The findings suggest that the interviewed organisations have some kind of structure or process to capture new ideas and improvement suggestions. Most organisations have employed more than one method or tool to allow a smooth flow of ideas. These structures and tools include creating internal websites/portals, ticketing systems for technical support, private social media, and dedicated innovation departments to assess innovations. For instance, O25, a large private telecommunications company, has developed an internal website to allow employees to freely discuss new ideas and propose enhancements to the ERP system. E25, an IT director, stated that they have employed a number of tools to capture ideas and suggestions. This includes the creation of an electronic discussion bulletin board, ticketing system for technical support, and company private social media in order to encourage employees to share their ideas and thoughts on the ERP system.

> *We have employed a number of tools to capture users' ideas and suggestions, and to discuss possible improvements or issues in any area, including the ERP system. These tools include a dedicated bulletin discussion board, ticketing system for technical support and company private social media. Employees are free to express their concerns regarding any issue, or suggest new services or improvements. All our top management, from the CEO to department heads, are taking this policy seriously, and interact with employees to support their ideas or solve issues they may have.*

E17, CIO of a banking and financial regulatory government organisation, stated that they have an organisation-wide policy regarding IT improvement that is supported by their chairman and board of directors:

> *We have an organisational policy regarding IT improvement ideas; this policy is supported by our chairman and board of directors. Simply, users can use our private internet portal to suggest new ideas or improvements for any IT-related issues or functions, then we review them, and if they are worthy and feasible, we take action to implement them. This has encouraged ERP users to explore the system and suggest improvements.*

Confirming the need to capture and nurture new ideas and improvements, O1, another telecommunications and IT company, has established a new department for innovations to encourage employees to present their ideas. E1, an IT consultant, stated:

> *We have an innovation department that encourages employees to present their ideas and improvement suggestions.*

To summarise, the findings show that the interviewed organisations possess some kind of structure or process to capture new ideas and improvement suggestions. Most organisations have employed more than one method or tool to allow a smooth flow of ideas. These structures and tools include creating internal websites/portals, ticketing systems for technical support, private social media, and dedicated innovation departments to assess innovations.

6.5.10 External linkage with other organisations

External linkage with other organisations is very helpful in organisational learning, since the concept of absorptive capacity is dependent on the ability of a company to be externally oriented and acquire new knowledge from external sources. The findings suggest that some organisations have used their relations and affiliations with other organisations to exchange knowledge about the ERP system. This helped them to gain a better understanding of the system's uses and development. For instance, E1, an IT consultant in a telecommunications and IT company, believes that, as a result of exchanging knowledge with other organisations that are implementing ERP, they enjoy positive system improvements. He states:

> *System improvements and use are a result of training and exchanging knowledge with other organisations that are implementing the ERP system at the same time.*

E25, an IT director in newly established IT and communication organisation, echoed and supported this, stating that affiliations with large and leading technology organisations have influenced ERP use positively and effectively:

> *Having affiliations and long-term contracts with organisations such as Accenture, Oracle and IBM, allows the review of our process and alignment of our systems with increasing changes in processes and services in our industry. This has a great impact on our ability to use the ERP functions more efficiently and effectively.*

In summary, external linkages with other organisations was found to be helpful in enabling organisational learning and, therefore, the ERP implementation, since the concept of absorptive capacity is dependent on the ability of a company to be externally oriented and acquire new knowledge from external sources. Organisations found to have good linkage with other external organisations show better understanding and use of the ERP functions.

6.6 Key Cultural Factors Affecting ERP Learning and Knowledge Sharing

In order to address the fourth research question, this section discusses the impact of key cultural characteristics (identified in the literature review) on the development of organisational learning as a key condition for the successful implementation of ERP. The literature review helped to identify five key cultural factors for creating an environment for organisational learning. These factors are organisational culture, participative decision-making culture, dialogue and communication, conflict and debate, and trust. The factors are discussed in the following sections.

6.6.1 Organisational culture

This section analyses how culture, structure and climate support the implementation, learning and knowledge sharing in organisations. Since culture is a primary determinant of innovation, it plays an important role during the implementation of ERP systems, and consequently its success (Shah *et al.*, 2011) and innovativeness (Kanter, 1985).

The findings show that most interviewees view organisational culture as an important factor that could foster and enhance the ERP implementation. Thus, each organisation may have different characteristics in terms of culture. These characteristics can be affected by the type of employees, the regulations and policies of the organisation, the national culture, and the mission of the organisation. For instance, E17, an experienced CIO of a banking and financial regulatory government organisation, finds that their culture is supportive and open to ideas:

Our top management are relatively young and very highly qualified, with vast international and local experience of great business standards. Our culture supports ideas and business improvements that are usually initiated by our employees, who are eager to work in a productive manner. In addition, most of our employees come from large, successful Saudi companies. They brought a positive culture of openness and professionalism to the environment.

E22, an IT director in a large government telecommunications organisation, also supported this:

We were one of the first few organisations in Saudi to have Internet access. Our field of work here is science and technology; this means we have some of the brightest brains in Saudi in science and technology. The education level here is very high; we have scientists and educators in almost all fields. This being the case dictates that we must employ the latest technologies in our work. This has created a culture that very much appreciates change and technology use. Top management is always supporting change and process improvements.

E18, an IT director of a government tourism and hotel company, explains how they dealt with cultural issues that they faced during the implementation phase:

In our organisation and at the employee level, we have a different mix of professional backgrounds. Around 75% of employees came from the private sector, hence a change-supportive culture. They had been exposed to dynamic environments and productivity-oriented cultures, while 25% are old government employees, where more of a relaxed and less productive work environment is the norm. These employees were mainly representing the resistance to many change attempts. This, however, was met with a good response from top management: 1) our chief board of directors holds a monthly meeting with all employees to discuss current issues and asks all employees to positively support change; 2) they empowered project managers and gave them the support they needed, whether financial or with regard to authority and powers required; 3) they gave full trust to the project team to make decisions that would positively ensure successful implementation; and 4) they encourage training for all users.

In addition, E11, an IT manager of a government regulatory organisation, outlined the main cultural enablers in implementing ERP. He states:

> *…the main cultural factors that helped us in implementing ERP were: 1) top management support that was clear and recognised by everybody in our organisation; 2) employees' desire to see improvements and developmental changes to processes and products; 3) we had a high level of trust in our project management department; 4) users were very supportive of projects such as ERP; and 5) a high level of openness and the willingness to make good use of the experiences of others, such as other organisations' knowledge and experiences.*

In contrast, other organisations found that their culture is, to some extent, hindering the implementation. One ERP manager (E21) in a government organisation states:

> *The matter of fact is that the culture we had was hindering the implementation. As a typical government organisation, there were no incentives of any sort to be given to encourage employees to use the system; besides that, there were no actions that could be taken against employees who resisted ERP. Moreover, and as a result, things here take a long time to be done, as change is not welcomed.*

This view is echoed by E8, CIO of a retail company:

> *Another major cultural obstacle we had was concealing errors from being discovered on the old manual system. This was known in our organisation, but no one could do anything until we implemented ERP – with very strong resistance, as expected.*

E20, an IT consultant in a large military organisation, thinks that his organisational culture's effect is two-fold. On one side, it is creating IT resistance, while on the other side, the nature of their organisation was controlling this resistance. He states:

> *Our top military generals made good use of the military culture we have in our organisation. A downside of our culture is that most of our employees are*

> *military personnel, who favour working in the field, rather than offices; physical work attracts them more. Technology is not something to which they are accustomed or favour either. This demanded greater efforts in training and in organisation-wide technology awareness… The positive side of being a military organisation is that orders are followed immediately. Therefore, staff had no choice but to follow orders to use the ERP system, regardless of whether they liked it or not.*

In addition, the negative effect of cultural diversity in which staff come from different backgrounds and national cultures, is another issue that is raised by E19, an IT VP in a large retail organisation. He states:

> *Non-Saudi users saw ERP as a threat to their jobs; any automation attempt could mean to them that there is a big chance of not having a renewed work contract once their current term comes to an end. Therefore, resistance was very strong and taking different forms, such as giving inaccurate process requests or information to the implementing teams, asking for changes in the system that were not possible, delaying the implementation, or continuing to complain about the system with the hope that the project would fail.*

Moreover, a CIO of a commercial bank pointed out the lack of knowledge sharing in his organisation:

> *There is a tendency in our organisation not to share knowledge with other employees. You find three users of the same department – none of them knows what the others are doing. Sometimes they are doing the same task, but each has his own way, without knowing about the other ways of doing his task. The team concept is not seen in some departments. We notice this issue when an employee requests a certain process to ease his tasks, with no regard for others in the same department. Simply, in some departments there is a lack of work development meetings, or even any sort of communication.*

The above findings suggest that the culture of individual organisations and the national culture may have effects on the adoption of new initiatives such as IT in general and ERP in particular. ERP learning, knowledge sharing and the implementation itself could be affected. Although some organisations have managed to overcome some cultural aspects, others may find it useful to employ strategies such as providing training, applying appropriate rules, and running awareness programmes.

6.6.2 Participative decision-making culture

Participatory decision-making facilitates results through the involvement of all employees of the organisation, resulting in commitment and satisfaction (Scott-Ladd and Chan, 2004). The findings suggest that most organisations that implemented participative decision-making policies had better ERP implementation experiences and outcomes. For instance, E21:

> *Our users were involved in most decisions regarding the ERP implementation. We had weekly meetings with key users to discuss changes. These meetings proved to be very helpful to address their needs and issues they had with ERP.*

This is echoed by E18, an IT director of a government tourism and hotel company, stating that their top management supports users' feedback and accommodates the appropriate decisions:

> *Our top management supports participative decision-making policies by communicating changes to all users through various channels (e.g. email circulation and meetings). The users' feedback is assessed carefully and actioned, if feasible.*

To summarise, it was discovered that most interviewed organisations had some working polices regarding participative decision-making approaches to enhance their ERP implementation experience.

6.6.3 Dialogue and communication

Leonard-Barton (1985) considers communication amongst potential adopters as a major force determining the rate at which the new idea, product or process spreads.

Communication is critical for the ERP project; it is important that communication between the different parts of the project team is clear, due to the interconnected nature of the system (Harvey, 2010). The results of this study show that many organisations recognise the importance of communication, and encourage organisation-wide communication regarding the ERP implementation. For instance, E18 states:

> *Communication is always encouraged; we have a monthly organisation-wide meeting with our chief board of directors, and many regular meetings between department heads and their employees.*

This is also mentioned by E20, an IT consultant in a large military organisation, claiming that his organisations not only encourage communication, but force it to take place:

> *Our ERP project sponsor, who was the second-highest ranking officer in our organisation, encourages and sometimes forces communication to solve issues and problems.*

On the other hand, E1, an IT consultant in a telecommunications and IT company, stated that the level and the extent of communication depend on politics between departments, managers and individuals. He states:

> *We have an open-door policy; however, the degree of communication between departments and employees depends on politics. Politics is heavy in our organisation.*

In summary, communication is considered an important factor in ERP implementation, as mentioned above. Most organisations in this study recognise the importance of communication, and encourage organisation-wide communication regarding the ERP implementation.

6.6.4 Conflict and debate

Conflict of interest regarding ERP is usually seen where there is a presence of personal, interpersonal or emotional tension towards issues related to ERP functions. Therefore, approaching conflict in a professional manner could help to reduce the conflict by bringing all parties into a debate where the ERP implementation goals and objectives are of higher importance than personal or departmental goals.

The findings of this study show that debates and conflicts that arise from the ERP implementation are usually resolved in a formal manner, where project sponsors, steering committees and top management usually intervene to solve such issues. For instance, E20 states:

> *Conflicts are usually around issues such as who can view or see what in terms of information. Some managers think some information must be kept within their department only. In this case, our project sponsor brings them together and attempts to resolve the issue. Otherwise, he forms a panel of executives to study the issue and make recommendations.*

This is also acknowledged by E17, a CIO of a banking and financial regulatory government organisation:

> *Generally, any major conflicts between departments are resolved by the steering committee. Only in very few cases does the CEO step in and make a decision on what needs to be done to resolve the conflict. I should say that politics in our organisation is at the very minimum; therefore, we all look for what is best for our organisation.*

Additionally, one ERP manager (E21) in a government organisation emphasised the role of their top management in solving problems and conflicts:

> *Top management, through the steering committee, help, especially when there is a conflict, or when departments request something that is not practical or has a great impact on other units or the business itself. They meet monthly to make sure the project is going as planned, and provide the necessary support.*

The findings show that, in most cases, top management mainly handled conflicts that resulted from the implementation of ERP. In some cases, they bring all parties into open meetings to discuss any conflict, whereas other organisations have very limited tolerance for any conflict, as discussed above.

6.6.5 Trust

Trust refers to the emotional safety in relationships that can assist the implementation of complex innovations such as ERP. The findings show that trust between users, top management, ERP project managers and the ERP system was seen by most interviewees as an important enabler that could ease the ERP implementation process. For instance, E17 considers trust to empower people to make changes, along with promoting new ideas:

> *Trust is one enabler that we feel empowers ideas and people to make changes and push for developments.*

In addition, E18, an IT director of a government tourism and hotel company, stressed the importance of top management's trust in project managers:

> *Our chief board of directors gave full trust and power to the project team to make decisions that would positively ensure successful implementation.*

E11, an IT manager who represents a governmental financial regulatory institution, thinks trust is also important in terms of users trusting project managers, and not only top management:

> *We had a high level of trust in our project management department, and users were very supportive of projects such as ERP.*

On the other hand, a lack of trust in management or the system could jeopardise projects and change attempts. E10, an ERP project manager working in a petrochemical organisation, stated that some of their employees had fears regarding the changes that ERP was delivering, which created resistance to the system:

> *…some users are somewhat old and had some doubts about ERP. Even worse, they feared that ERP meant that they might be asked to leave the organisation, either for redundancy or lack of IT knowledge.*

This is confirmed by one ERP manager (E9) in a mid-size transportation company, stating that users' fears of replacement created resistance to the system:

> *Users' fear of replacement or layoff created resistance as a result of the ERP implementation. The heavy dependency on manual paper work for a long time in our organisation's life made it hard for users to accept the change to an almost paperless environment.*

From the above analysis, it is apparent that trust is an important factor that not only enables learning and knowledge sharing, but also enables the whole ERP implementation process. This can be managed through training and developing users' skills in ERP.

6.7 Summary

This chapter has presented an analysis of the qualitative data collected from the interviews. It shows the main factors and key enablers and inhibitors for the successful implementation of an ERP system as an innovation. All the main factors and key enablers and inhibitors found to be important were classified according to the research questions. They are grouped into four main categories: key factors affecting the implementation of the ERP system, technology innovation diffusion factors, ERP learning and knowledge sharing factors, and learning organisational and cultural arrangement factors.

In addition, the findings show important information and details; these valuable details were provided by key personnel in Saudi organisations from different sectors and industries, most of whom are decision makers and in key positions related to ERP systems. Therefore, taking their valuable input into consideration will aid organisations implementing ERP systems to enjoy a more successful implementation, making the implementation experience better, easier and faster.

The analysis of the collected data indicates that most of the executives and managers interviewed are well qualified and seem to be experienced in the management of ERP. Twenty organisations interviewed claim that they have prior knowledge and experience of ERP. They also acknowledge its complexity. However, most of them failed to recognise the importance of prior knowledge as a key condition for the successful implementation of ERP as a complex system. The selection of motives indicates a satisfactory knowledge and understanding of the potential benefits that ERP can deliver. However, there is no evidence that these organisations are well equipped and prepared in terms of human, organisational and technical resources in order to effectively assimilate, adapt and use ERP and get the expected benefits. More benefits could be gained if the acquisition of ERP is complemented by the development of appropriate capabilities and organisational changes which can facilitate a better compatibility between the innovation and the context in which it is being operated. Most organisations are benefiting from the use of ERP but are certainly not gaining the full benefits that this innovation can deliver. The findings related to the incompatibility that exist between ERP system and the context in which it is operated can also suggest the inappropriateness of the existing organisational arrangements, organisational structure, procedures, mechanisms and routines. There is no strong evidence of shared knowledge and organisational learning in most of the organisations. The development of an appropriate level of knowledge base, which is a key condition for the successful implementation of innovations such as ERP, is clearly not being given the adequate priority. There is no strong evidence indicating that learning and trainings activities aimed at individuals are captured by the whole organisation in order to build the organisational learning and enhance its level of absorptive capacity.

The next chapter will provide a detailed discussion all of the findings of this study and will link these empirical findings to the theoretical discussion.

Chapter Seven: Discussion

7.1 Overview

This chapter discusses the findings of the analysis of the collected data. The discussion and outcomes of this chapter are based on the four main research questions. It discusses the key organisational factors affecting ERP implementation, the key factors affecting the adoption and diffusion of ERP, the key factors affecting ERP's learning and knowledge sharing, and the key cultural factors affecting ERP learning and knowledge sharing in Saudi Arabia. In addition, the discussion relates the findings of this study to the theoretical discussion conducted in chapters 2 and 3.

7.2 Key Organisational Factors Affecting the ERP Implementation

This section is aimed at discussing the key organisational factors affecting ERP learning and knowledge sharing, and consequently ERP implementation in the sample organisations. It discusses the organisational arrangements that enable or inhibit the successful implementation of ERP projects. These factors include ERP system and vendor selection, prior system(s) in place before implementing ERP, strategies adopted by organisations to acquire and implement the ERP system, methods adopted by organisations to acquire and implement the ERP system, ERP implementation scope, ERP project budgeted cost and time, implementation motives, organisational structure, and change management. These factors are discussed in the following sections.

7.2.1 ERP system and vendor selection

The findings show that organisations select their ERP system and vendor based on a number of reasons. These reasons are: 1) the cost of the system, 2) the level to which the system fits their organisation, 3) ability and flexibility in customising the system, 4) popularity of the vendor, 5) system/vendor is widely used by competitors, 6) availability of skilled staff in the market, 7) vendor's presence in the market, 8) technical support, 9) recommendation by consultants, and 10) staff's ability to use it.

Based on the organisation's nature and type, and the business environment, a system and vendor are chosen to fit needs. This shows the importance of the careful selection of an ERP system and, therefore, its vendor. The importance of a vendor as an enabling factor of ERP implementation is confirmed by a number of studies (Wei and Wang, 2004; Shehab *et al.,* 2004; Everdingen *et al.,* 2000; Sprott, 2000). This is why Moohebat *et al.* (2010) suggest that developing countries are dependent upon ERP vendors. This is also supported by Somers and Nelson (2004) who assert that the partnership between the implementing organisation and the ERP vendor is crucial throughout the ERP life-cycle. In addition, it is quite clear that the knowledge base exiting within the organisation and the level of absorptive capacity required for the effective use of ERP does not seem to be acknowledged as an important motive for selecting vendors. Only one of organisations have recognised the staff's ability to use it as motive to select the appropriate system for their organisation. The results of this study also found that the majority of organisations (20) had their training offered by vendors either solely or jointly. These organisations attributed their choice of ERP vendor(s) to their training needs, due to the fact that vendors are the most capable of providing the necessary training for their systems, since the vendor–user knowledge gap can create a major obstacle for effective ERP system usage. Besides that, the expertise and knowledge required by users to capture the intent of the system developers cannot be taken for granted. This result is in line with Nwankpa and Roumani's (2014) suggestion that using the technology in ways expected by system designers and developers can present a big challenge for users.

7.2.2 Prior ERP system in place before implementing ERP

The findings show that most interviewed organisations are either newly established, or they used to have old legacy systems in place before implementing ERP. Only five organisations had an old ERP system in place, which means the system is not new to the implementing organisation. For those organisations that have an old ERP system in place, this could be an important factor in helping them to implement the new ERP system, since the whole organisation is familiar with such systems. Organisations that had an old ERP system in place before implementing the new ERP are more familiar with how the system works. This experience with ERP could lead to more successful implementation, since ERP needs a high level of absorptive capacity (Zahra and Goerge, 2002; Daghfous, 2004; FORFAS, 2005; Martin, 2005; Gray, 2006), which enables an organisation to effectively acquire, assimilate, adapt and use new knowledge related to innovations such as ERP system. Therefore, good absorptive capacity, hence prior knowledge and experience, increases the success rate of ERP projects and decreases the probability of failure. These findings reflect those in the literature, including studies on how learning affects the implementation of an innovations (Saad, 2000; Tidd and Bessant, 2011; Leonard-Barton, 1985; Rogers, 1983), along with those of Leonard-Barton (1992) and Smith and Sharif (1999), which identified the knowledge and skill embedded in employees as a major source of knowledge.

7.2.3 Strategy adopted by organisations to implement the ERP

The findings reveal that most organisations in this study used the phased strategy (10/25). This result is in accordance with Abbas' (2011) study, which indicates that the phased strategy is one of the most common methods to implement ERP systems. The phased strategy reduces the implementation scope, which minimises the risks associated with installation, customisation and functionality of the ERP system. The results also suggest that ten organisations had been in business for over 10 years and had an existing process in place. In addition, it is used mostly by large organisations (18 organisations) with a large number of employees. O'Leary (2000) and Curko *et al.* (2012) emphasise that if an organisation is large and complex, the phased strategy is the most appropriate for use.

The findings show that the second most used strategy is the big bang strategy (7 organisations) in which all applications and modules are installed simultaneously throughout the organisation. The prime advantage of this approach is that there is no need to interface between the old and new systems (Welti, 1999; O'Leary, 2005). Since there are no added steps and costs can be reduced, provided the implementation is planned properly. However, the reason for its unpopularity among the interviewed organisations is that if the new system becomes inoperable for any reason, all efforts would be lost. Moreover, despite the fact that the strategy can be implemented in just a short time, the actual development of the plan is a time-consuming process (Khanna and Arneja, 2012). This result is in accordance with Abbas' (2001) suggestion that today's organisations do not find this strategy preferable; increased resources are required when the system is to become live.

This research also shows that organisations used the hybrid strategy (5 organisations), where the use of more than one strategy at the same time is allowed. It was found in this study that the strategy is mainly used by large organisations with different locations and sub-organisations, and perhaps different functions. This result are also in line with Abbas' (2011) findings, which showed that large organisations with different locations find this strategy suitable.

In addition, this study found that the parallel strategy (3 organisations) is the least used strategy. In this strategy, the new ERP system and the old system work simultaneously for a certain period of time. Furthermore, there is no clear pattern or relationship between organisations' sector, industry, size, choice of vendor, or systems in place with the choice of the implementation of this strategy.

The results of this study suggest that although some strategies seem to be used more than others, among the interviewed organisations there are heterogeneous decisions in terms of choosing the implementation strategy. It was also shown that organisations chose the most suitable strategy for their specific organisational characteristics, such as industry regulations and attributes, size, the presence of an old system, culture, structure, prior experiences, etc. This could be an important enabler for implementing the ERP system. This finding is consistent with those of Cooke and Peterson (1998) and Mandal and Gunasekaran (2003), who suggest that an ERP system can be successfully implemented only after considering a number of factors, in order to choose the most appropriate implementation strategy. However, no clear pattern or relationship can be found between organisations' sector, industry, and the choice of vendors or systems with the choice of using a particular strategy over the other ones.

7.2.4 Methods adopted by organisations to implement the ERP system

This research suggest that the vanilla method is the most widely used method by the Saudi organisations. Eleven organisations interviewed in this sample used the vanilla method to implement the ERP system, either to avoid any customisation to the ERP system, or because there was no need to customise the system. The literature findings suggest that the vanilla implementation type hardly requires any customisation of the ERP package, due to which many organisations make effective use of it as claimed by Parr and Shanks (2000) and Holland *et al.,* (1999). Moreover, nine organisations which used this method were relatively new organisations, with a manual process in place, while another nine organisations were undergoing major business process changes across their organisations. Eleven organisations had old legacy systems in place, and needed to have a new business process, while four organisations were upgrading their old ERP systems. These organisations avoided any customisation to the system, and therefore reduced the complexity associated with it. These results are in line with other studies of Alshawi *et al.* (2004), Siriginidi (2000), Somers and Nelson (2001, 2004), Nah *et al.* (2001) Palaniswamy and Frank (2002), Mabert *et al.* (2003) Shanks and Parr (2000), Soh and Sia (2005) and Yakovlev and Anderson (2001). These studies claim that organisations should seek to avoid customisation because of the complexity of the problems involved. In addition, the findings show that the second most used method is the middle-road method. Eight organisations used this method, where some customisation to the ERP system was made along with some level of BPR as well. In this method, customisation to the ERP system is made along with a considerable level of business process re-engineering (BPR), unlike the vanilla method, where customisation is at the very minimum, and no major BPR takes place.

The research also shows that only six organisations interviewed used the comprehensive method. This method is ambitious in nature, and so it requires substantial ERP system customisation efforts and resources, and a considerable level of business process re-engineering. It was found that most of the organisations that used this method were either large enough to find it impossible to use ERP without any changes to the ERP process to reflect the necessary process, or they had been in business for sufficient time for their business process to be more difficult to change, either due to the nature of the business or the organisational culture. The use of this method requires a high level of absorptive capacity, since it involves substantial changes in process. It also requires skilled IT staff and users to handle and understand the new process changes. A number of researchers (Light, 2001; Nicolaou, 2004; Nadhakumar *et al.*, 2005; Koch *et al.*, 1999) argue that customisation slows down the project, introduces dangerous bugs into the system, and makes upgrading the software to the ERP vendor's next release very difficult, as the customisations will need to be torn apart and rewritten to fit with the new version. However, the use of this method is supported by Bingi *et al.* (1999) and Luo and Strong (2004), who claim that despite these disadvantages of heavy customisation, it is common for organisations to customise certain parts of the software, in order to adapt it to a unique context.

Although some methods seem to be used more than others, among the interviewed organisations there are heterogeneous decisions in terms of choosing the implementation method. It was also shown that organisations chose the most suitable method for their specific organisational characteristics, such as industry regulations and attributes, size, the presence of an old system, culture, structure, prior experiences, etc. This could be an important enabler for implementing the ERP system. The choice of methods used could be influenced by the level of prior knowledge base and absorptive capacity organisations had. Since complex methods such as the comprehensive method requires significant organisational change though BPR and a better level of knowledge base to acquire, assimilate, adapt and customise and align the system with their existing process in order to better use it. This finding is consistent with those of Cooke and Peterson (1998) and Mandal and Gunasekaran (2003), who suggest that an ERP system can be successfully implemented only after considering a number of factors in order to choose the most appropriate implementation strategy. This could be applied also to the choice of methods used to implement the ERP system, since methods also need substantial organisational arrangements to be used successfully. These arrangements include aligning the business process to the software implementation (Holland *et al.*, 1999; Sumner, 1999), modifications to user interfaces, reports, messages, and even program codes, and additions of bolt-on logic to the native system (Dittrich and Vancouleur, 2008).

7.2.5 ERP implementation motives

The research shows that organisations were motivated to implement the ERP system by a number of reasons. This indicates that these organisations acknowledge the benefits that the ERP system can bring to their organisations. Similarly to most innovations, the prime reason for adopting an ERP system is principally related to the challenges arising as a result of fierce competition, globalisation, process unification, meeting necessary organisational expansions, integrating customers and suppliers, speeding up processes, reducing operational costs, gaining more control over operations and staff, and responding to regulatory requirements. These motives are in line with motives found by Abukhader's (2015) study of implementation motives in Saudi Arabia's private hospitals. These findings are also in line with the general literature on implementation of other innovations (e.g. Davenport, 2000; Markus, 2000; Chen, 2001; Velcu, 2007; Nicolaou, 2004; Matolcsy *et al.,* 2005; Bingi *et al.,* 1999).

7.2.6 ERP implementation scope and budgets

The results of this study indicate that most organisations had difficulties in managing the scope of the ERP implementation project. Nineteen organisations went through some degree of scope changes. The interviewees in this study attributed the scope changes to a number of reasons. These reasons include management and users' lack of understanding of the ERP process and its functions and benefits, changes in the overall organisational ERP strategy, adding or cancelling certain modules, speeding up the implementation project, and a long time span as a result of a slow and interrupted implementation. However, some organisations did not make changes to their original scope. These organisations either devised a good implementation plan, or were new and small organisations.

Scope of a project is a metaphorical map of the expected achievements of the project, which allows for a clear understanding of the resources that will be required to reach these expected outcomes. Scope directly affects development of budgets as well. As argued by Gargeya and

Brady (2005), without understanding the scope of a project, it cannot be planned effectively). This is explains why Holland *et al.* (1999), Rosario (2000) and Wee (2000) claim that it is imperative that the scope of the project is deliberated at length and defined with clear parameters. Similarly, it is critical that targets are also clearly defined and the progress of the project benchmarked rigorously. It was noted that expectations of stakeholders, including the senior managers and other personnel of the organisation is a key reason why ERPs failed on numerous occasions (Nah, 2003). Therefore, it becomes all the more important for a client organisation to focus on the scope of the ERP project with thoroughness before the plan is taken to the senior management of the organisation. Having poor plans, targets, and vague scope has led many ERPs to fail as well (Somers and Nelson, 2004).

The need to select and acquire a complex ERP system is affected by the cost as well as the lack of an appropriate level of knowledge base, experience and organisational arrangements. Therefore, the findings in this study, which present scope management as an obstacle to the ERP implementation in the interviewed organisations, agree with the findings of the previous studies of Umble *et al.* (2003), Esteves and Pastor (2000) Aldayel *et al.* (2011) and Davenport (2000). Moreover, these results are in line with Hossain *et al.* (2011) who found that, in Saudi Arabia, there a lack of understanding of which modules to implement and therefor scope changes up and down happen in the middle of implementation.

7.2.7 ERP project budgeted cost and time

Most organisations had some serious ERP budget issues. It is found that, as a result of changes to the original scope, twenty one organisations had actually exceeded their planned time, while seventeen organisations could not stay within their budgeted costs. Moreover, sixteen organisations finished the implementation project with an increase of over 50% of the planned time. The other eight organisations managed to finish the project with less than a 20% increase in time, while only four organisations managed to adhere to the planned timeframe. It was found that changes to the implementation scope, in most cases, would affect the implementation timeframe and the budgeted cost negatively. In addition, what causes the scope to change is also causing the rise of the budgeted cost and/or the timeframe. The few organisations that displayed strong control over their budget and timeframe also had strong control over their implementation scope. Organisations that managed the scope effectively had a skilled implementation team, used the vanilla method, minimised customisation, used an effective implementation plan, and received both good technical support from their vendors and strong support from top management.

The findings in this study, which present the ERP project's budget (time and cost) as an inhibitor to ERP implementation in the interviewed organisations are in line with, the studies of Schwalbe (2000), who identified three competing and interrelated goals, namely scope, time and cost goals, which affect the implementation process. This is echoed by Gargeya and Brady (2005), who state that cost overruns and developmental delays are costly, sometimes fatal results of ineffective planning. Furthermore, Sumner (1999) claims that in order to control the budgeted implementation's time and cost, employees should be informed in advance regarding the scope, objectives, activities and updates, and accept that change will occur.

7.2.8 Organisational structure

The findings show that the structure of an organisation plays an important role in enabling and facilitating the ERP implementation in most organisations. A well-organised organisational structure can positively affect the ERP implementation. Thus, a complicated structure and hierarchy could have an adverse effect on ERP implementation. Moreover, a well-organised structure would help organisations to speed up the process of adopting and implementing ERP, since the flow of commands goes smoothly and fluidly through departments. Most organisations have managed to strengthen their existing structure to facilitate the ERP implementation. These findings are supported by Chiva and Alegre (2007), Tohidi and Jabbari (2011), Burnside (1990), and Ke and Wei (2008), who state that innovation is increased by the use of highly participative structures and cultures that support learning. Alternatively, organisations with an inflexible structure in managing learning and the ERP implementation have considered and employed the implementation as a project-based model to overcome their structural issues. This is supported by Burnside (1990), who states that top management can create ad hoc committees, special task forces and planning meetings to enable learning, if the structure is not fixable enough to support learning.

7.2.9 Change management

The findings of this study show that most organisations have change management policies and change managers to manage their organisation-wide change. That change management is essential in supporting learning and, therefore, increasing understanding, adoption and use of the ERP functions, which leads to successful implementation. In addition, the findings show that organisations employ the change management concept, due to their acknowledgement of the importance of having change managers to oversee policies and procedures of organisations regarding change management. Change managers act as facilitators to ease the implementation process, raise awareness on ERP, and align the implementation with their organisation's change polices. The implementation of an ERP system is likely to produce widespread organisational changes, such as the redesign of business processes and patterns of work flow. Implementing an ERP system can also result in a noticeable effect on the culture of the company. Additionally, ERP implementation changes the original power balance of key stakeholders, affects the benefits of vested groups, and requires followers to take on new job functions and responsibilities. Moreover, the level of change that ERP delivers to any organisation calls for more appropriate change management. In spite of individual managers and executives are well qualified there is no strong evidence of shared and organisational learning in most of the organisations. As suggested in chapter 4, the culture of sharing is still weak and not so well developed to accommodate changes especially in technology use. This finding is in line with prior studies such as those of Schumechar (1997) and Al-Mashari and Zairi (2000), who stressed the importance of change management in ERP implementation.

To summarise, this section which discussed the key organisational factors affecting the implementation of ERP in order to answer the first research question. The outcomes of this study show that nine key organisational factors affect the implementation of an innovation such as ERP. Two of these were found to be inhibiting ERP implementation: ERP implementation scope and budgets, and ERP project budgeted cost and time. The remaining seven factors were found to be enabling, helping organisations to learn and share knowledge among their users, and therefore, assisting the ERP implementation. These enablers are ERP system and vendor selection, a prior ERP system being in place, strategies adopted by organisations to acquire and implement the ERP system, methods adopted by organisations to acquire and implement the ERP system, implementation motives, organisational structure, and change management. Table 7.1 summarises the key organisational factors affecting ERP implementation in Saudi Arabia.

Table 7.1: Key organisational factors affecting ERP Implementation in Saudi Arabia

Key factors	Result found in this study
ERP system and vendor selection	Enabler
Prior ERP system	Enabler
ERP implementation strategy	Enabler
ERP implementation methods	Enabler
ERP implementation motives	Enabler
ERP implementation scope and budgets	Inhibitor
ERP project budgeted cost and time	Inhibitor
Organisational structure	Enabler
Change management	Enabler

7.3 Key Factors Affecting the Adoption and Diffusion of ERP

This section aims to discuss the key innovation diffusion attributes identified by Rogers (1985) in Chapter Three, and empirically investigated in Chapter Six. It discusses how the different organisations examined are managing their innovation adoption and diffusion. In order to answer the second research question, this study identifies and discusses these factors in the following sections: relative advantage, compatibility, complexity, trialability and observability.

7.3.1 Relative advantage

The current study found that most organisations have realised and observed the advantages of the ERP system over their previous systems. Among these advantages are cost reduction, process time reduction, common and mutual understanding of processes and procedures among staff and departments, improving coordination and minimising interdepartmental conflict, enhancing efficiency and effectiveness in organisational work, and reduced human error. Therefore, the acknowledgement of the relative advantages of ERP could help in increasing the rate of adoption of ERP. This finding is consistent with that of Rogers (1983), who states that relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. In addition, this study mirrors those previous studies that have examined the relative advantage of ERP systems (Hong and Kim, 2002; Poston and Grabski, 2001; Al-Mashari, 2003; Rajagopal, 2003).

7.3.2 Compatibility

The results of this study indicate that there are incompatibility issues in ERP implementation. Most organisations that were implementing ERP for the first time found that ERP was incompatible with their existing systems and the way they do business. In addition, ERP is seen as a radical change to their existing process. It may also create major changes in the job descriptions of some users and, perhaps, might result in loss of jobs, as a result of the incompatibility of ERP. This lack of compatibility could be further explained by the complexity of the ERP system that these organisations found. This incompatibility could hinder ERP implementation by lowering the adoption rate, as confirmed by Rogers (1983).

7.3.3 Complexity

The current study found that most organisations interviewed found the ERP system complex to understand and implement, and consequently difficult to use. The perceived complexity of ERP systems among organisations is attributed by some interviewees to lacking an adequate level of understanding of ERP use and functions. This, in turn, indicates that these organisations have a low understanding of ERP capabilities, thus lowering their absorptive capacity. Therefore, as discussed in earlier sections, such organisations encounter difficulties in managing their ERP implementation scope and budget, since they keep changing their scope as managers and users become familiar with ERP. This result is in accordance with the studies of Volkoff (1999), Poston and Grabski (2001), who suggest that organisations often face difficulties in integrating ERP software with hardware, operating systems, database management systems and telecommunications – since ERP systems include numerous features, modules and users which must be considered carefully when implementing the system (Hossain *et al.*, 2002; Markus and Tanis, 2000). In addition, the effect of low absorptive capacity can decrease the likelihood of adoption and successful implementation of ERP in businesses from developing countries such as Saudi Arabia. Consequently, this complexity of

ERP could negatively influence the rate of adoption of ERP. This result is consistent with the work of Rogers (1983) and Premkumar *et al.* (1994), in which they consider complexity to be an inhibitor to innovation implementation.

7.3.4 Trialability

The findings of this study show that trying the ERP system before purchasing it is not a common practice, since organisations, in general, consider ERP as a simple IT “gadget” that can easily be adopted and used. This indicates that there is a lack of awareness regarding the complexity involved, and the key factors for the successful implementation of ERP. Therefore, it would negatively affect the adoption rate in Saudi organisations. These findings are in line with Rogers’ (1985) claim that the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Furthermore, the lack of experimentation with the new system with the operating environment in which the product will be used is considered an obstacle to the implementation, as suggested by Martin and McClure (1983) and Kunda and Brooks (2000). This result also conforms to the findings of other studies (e.g. Leonard-Barton and Deschamps, 1988; Davis *et al.,* 1989), in which it was found that potential adopters will feel more comfortable with the innovation if they are provided the opportunity to experiment with it, and gain a better understanding of the factors for its successful implementation.

7.3.5 Observability

The results of this study indicate that most organisations are well aware of ERP systems’ use in their industry and in general. In some cases, their employees may have come from organisations that have already implemented an ERP system, and have been exposed to the system and its benefits. These results are consistent with the findings of Rogers (1983; 1995), who argues that the software component of a technological innovation is so apparent to observation possess more observability, and usually have a relatively faster rate of adoption. In addition, these results also reflect those of Al-Gahtani (2003), who also found that observability has a strong significant positive relationship with computer adoption and use in Saudi Arabia.

In summary, this section discussed the key factors affecting the adoption and diffusion of ERP are discussed in order to answer the second research question. The outcomes of this study show that there are five key innovation diffusion attributes for ERP implementation. Three of these were found to be inhibiting ERP implementation. These are trialability, compatibility and complexity. The remaining two factors enabled and helped organisations to learn and share knowledge among their users, assisting the ERP implementation. These enablers are ERP relative advantage and observability. Table 7.2 summarises the key factors found to be affecting the adoption and diffusion of ERP in Saudi Arabia.

Table 7.2: Key factors affecting the adoption and diffusion of ERP in Saudi Arabia

Key factors	Result found in this study
Trialability	Inhibitor
Compatibility	Inhibitor
Complexity	Inhibitor
Relative advantage	Enabler
Observability	Enabler

7.4 Key Factors Affecting ERP's Learning and Knowledge Sharing

This section is aimed at discussing the key factors affecting ERP's learning and knowledge sharing (i.e. organisational learning) to support the ERP implementation in the sample organisations. In order to answer the third research question, this study identified ten learning and knowledge sharing factors affecting the implementation of an innovation such as ERP, and consequently understanding, adapting and using the ERP functions efficiently. These factors include understanding, adapting and effectively using the ERP functions, learning and development, managerial commitment and support, openness and experimentation, having a clear vision and strategy for ERP learning, existing and accumulative knowledge, discussing problems and errors, documentation of knowledge gained, process and structure to capture new ideas, and external linkage with other organisations. These factors are discussed in the following sections.

7.4.1 Understanding, adapting and effectively using the ERP functions

Understanding, adapting and effectively using the ERP functions would enable organisations to make positive use of the system and improve its functionalities. Organisations usually encounter some level of difficulties in understanding, adopting and using these systems, due to the complexity of the system. Therefore, it is suggested that organisations that have established more effective learning and knowledge management would have a higher level of understanding than others. The results of this study show that, despite the fact that the majority of organisations encourage the learning and development of users, as concluded in the previous section, not all organisations have achieved high scores in understanding, adapting and using ERP. It was found that although organisations use different ERP implementation strategies and methods, they have no major effect on their ERP abilities. Furthermore, the results suggest that the most important factor is ERP learning and training. This finding is in accordance with that of Ke and Wei (2006), who state that ERP, as a complex system, places a heavy learning burden on new users in terms of understanding the system and learning how to use it. Additionally, the other reason found to have a positive impact on organisations' ERP abilities is having experienced and knowledgeable IT staff on board. Boudreau and Robey (1999) claim that since the implementation of ERP can be regarded as a radical techno-organisational innovation and a radical logistical innovation, it requires the simultaneous implementation of new technology, new business processes, organisational structures and individual changes. As a result, knowledgeable and well-qualified IT staff with strong IT and ERP implementation skills could ease the complexity of implementation. The interviewees also suggested that having young and new staff in their organisations helped in acquiring better ERP abilities. The Saudi Arabian workforce is generally populated by young and well-educated workers. Other factors found to have a strong influence on organisations' ERP abilities include having an old ERP system in place, or being a newly established organisation. Logically, new organisations have more to learn when compared to mature organisations. This suggests that mature organisations have greater levels of knowledge and thus may be more comfortable or adept with change, whereas newly emerging companies or start-up companies have less experience and resources, and therefore prefer to employ trained people. The literature supports these findings. For instance, Kraemmerand *et al.* (2003) argue that first-time adopters, especially those who are relatively unfamiliar not only with ERP but also with similar systems, may well, unconsciously, allow the technology to play a more dominant role than more experienced companies, since, for new adopters, ERP systems represent a knowledge base that has not previously been available to the organisation (Ahmed and Khan, 2013; Ramburn and Seymour, 2014; Huber, 1991).

A number of factors were found to have a great impact on ERP's learning and knowledge sharing, in order for organisations to be better able to understand, adapt and use the ERP functions efficiently. These factors are discussed in the following sections.

7.4.2 Learning and users' knowledge development

The results of this study found training and development to be an important factor that enabled organisations to successfully implement ERP. There is a strong consensus among interviewees on the importance of training as a means to successfully implement ERP system and gain most of the expected benefits. Gavin that all of the interviewed organisations believe they have scored no less than 3 out of 5 in their ERP abilities levels in understanding adopting and using the ERP system, training efforts have increased their organisational learning and absorptive capacity levels. The training and learning efforts have been captured by the whole organisation and not just at the individual level. These findings are in accordance with prior studies, such as those of Umble *et al.* (2003) and Bajwa *et al.* (2004), who emphasised the importance of training as a critical factor in ERP implementation. In addition, these findings reflect those in the previous literature, such as the studies of Clayton (1997), Clarke and Roome (1999), Orlikowski *et al.* (1995), Purvis *et al.* (2001) and Greenhalgh *et al.* (2004), who identified this factor as an important element in promoting learning and innovation within organisations.

In addition, the findings also indicate that organisations have taken a variety of measures to foster and encourage learning and knowledge sharing regarding the implementation and use of the ERP system. They have used different training types, providers, locations, durations, subjects, beneficiaries and implementation phases to encourage the learning and development of users. Table 7.3 compares the learning strategies and methodologies based on the literature and research findings. It is important to note that interviewees did not categorise the learning strategies and methods they used in the way that they are categorised in the literature review – as active, action or cooperative learning, and so forth. They explained the method and then referred to examples, which could be matched to categories of learning strategies identified in the literature. Moreover, it should be noted that the arrangement of the learning strategies in the following table does not suggest their order of importance. This is because learning strategies are subjective in nature and their relevance to each organisation is shaped by circumstances (Williams, 2001).

Table 7.3: Comparison of learning strategies and methodologies based on the literature and research findings

Literature Findings	Research Findings
Action Learning 1. Group of peers meeting 2. Group discussion 3. Experimentation	1. Group discussion through meetings
Active Learning 1. Problem solving 2. Teamwork 3. Simulation 4. Case work 5. Feedback check 6. Small group discussion 7. Brainstorming 8. Reading 9. Writing	1. Brainstorming and dialogue 2. Experiential learning 3. Self-learning 4. Online learning 5. External linkage with other organisations
Experiential Learning a. Outside Classroom 1. Practical experiences 2. On-the-job training b. Inside the Classroom 1. Role-playing 2. Case studies 3. Post-project reviews 4. Internal audits 5. Oral post-mortem	1. Experiential learning 2. On-the-job training
Cooperative Learning 1. Small group learning 2. Classrooms	1. Classrooms 2. Workshops 3. Seminars and conferences 4. Education programmes
Problem-based Learning 1. Problem-solving group	1. Experiential learning 2. Meeting to discuss problems
Coaching and Mentoring 1. Top-down 2. Peers	1. Coaching and mentoring 2. Peers: key users training

These in-depth interview findings suggest that the interviewed organisations prefer to use active and cooperative learning as their primary learning strategies. These results conform to what McGoldrich *et al.* (2000) and Boyer (2002) found, which was that action learning allows teams to learn together and build knowledge collectively. This quality makes action learning a suitable strategy for team learning strategy. The theory itself posits that a person is always building knowledge individually or in a group setting, using whichever between formal and informal channels may be available to increase their knowledge, improve their skills, and enhance their capabilities to perform their roles better and more efficiently. The adoption of such a strategy is considered a cultural shift for many Saudi organisations, for a number of reasons. Adopting developed countries' learning practices is in part due to the exposure of organisations to other international organisations. As an additional factor, globalisation has forced some organisations to adopt new learning practices to be able to compete globally and successfully sustain their business operations.

Cooperative learning is the second most popular learning strategy used by organisations. The use of this strategy follows the findings of Jenkins *et al.* (2003) who found that this type of learning advances individual greater growth of knowledge, assuming that a person's individual actions are more transparent and accountable. This assumption becomes more effective in competitive settings, making individuals responsible and accountable.

The study also found evidence (Table 7.3) of other learning strategies, such as experiential, action and problem-based learning, as well as mentoring and coaching. These results also match those observed in earlier studies, such as that of Williams (2001), who states that learning choices are often subject to organisations' circumstances; organisations need to consider the most suitable learning strategy according to their own circumstances. Therefore, learning methodologies should vary from one organisation to another, taking into account the type of knowledge that is required, the nature and type of business, financial constraints, learning needs, available technology, and requirements for human resource development. In addition, organisations need to acknowledge when and where the knowledge can and should be acquired, and what will maximise the understanding and transfer of knowledge to the employees. Thus, the key principle for determining the choice of learning strategy and methodology is choosing the best method, which provides the maximum intended benefits, the lowest cost and time, and produces high-quality output by improving processes and eliminating undesirable outcomes (Joseph, 1995).

7.4.3 Managerial commitment and support

The findings show that most organisations interviewed considered managerial commitment and support to be an important enabler in allowing them to manage their learning process. The findings show that management supported ERP learning by monitoring progress, acting as a project sponsor and champion for the ERP project, encouraging and supporting employees to try and use the system, and holding meetings to solve problems related to the implementation. These findings reflect those in the literature, as in the research of Stata (1989), McGill *et al.* (1992), Garvin (1993), Nonaka and Takeuchi (1995), Jerez-Gomez *et al.* (2005), Goh (1997) and Onag *et al.* (2014), who highlighted the importance of managerial commitment and support for learning. Ultimately, recognising the relevance of learning and developing a culture that promotes the acquisition, creation and transfer of knowledge as a fundamental organisational value could support the successful implementation of ERP.

7.4.4 Openness and experimentation

Based on the above findings in Chapter Six, openness to new ideas and suggestions and the encouragement of users to explore ERP were found to represent an important enabler that could support the successful implementation of ERP. Additionally, the findings show that organisations lack effective policies to encourage new ideas and suggestions, and encouraging users to explore ERP may encounter difficulties and limitations concerning their abilities to understand, adapt, change and use the ERP functions. This may affect the success of the ERP implementation. Moreover, the findings show that in order to foster a climate of openness that welcomes and captures new ideas and ERP improvement suggestions, some organisations have employed strategies and tools. These tools include dedicated bulletin discussion boards, ticketing systems for technical support and company private social media. In addition, other organisations have established an innovation department to oversee and manage innovations. These findings mirror those in the literature, such as those in the research of Chiva *et al.* (2007), Nevis *et al.* (1995) and Weick and Westley (1996), who highlighted openness and experimentation as important factors of learning.

7.4.5 Clear vision and strategy for ERP learning

The findings show that most organisations interviewed did not have any strategy for their ERP learning and training. As a result, this may have hindered learning and knowledge sharing, which are necessary components of the ERP implementation process and learning itself, since a clear business plan and vision are required to guide the project throughout the ERP life-cycle (Loh and Koh, 2004). Furthermore, if an organisation lacks a shared vision, individual actions may not build the synergy needed to sustain learning capability. These findings mirror those in the literature, such as those from the research of Jerez-Gomez *et al.* (2005), who highlighted the importance of the systems perspective of learning, which entails bringing the organisation's members together around a common identity. This is also confirmed by McGill *et al.* (1992), Senge (1990) and Sinkula (1994), who emphasised that having a shared vision regarding learning within an organisation means moving beyond the employees' individual goals towards a collective and shared vision.

7.4.6 Existing and accumulative ERP knowledge

In Chapter Six, the findings showed that existing and accumulative knowledge were found to be an important factor that enabled organisations to successfully implement ERP. In addition, it was found that prior ERP knowledge is crucial in understanding, adapting and using the ERP functions. These findings are in accordance with previous studies many of which suggest ERP projects can be considered evolving processes, while the knowledge and learning acquired from an ERP project may influence decision making in the future (Law *et al.*, 2010). Cohen and Levinthal (1990) second these observations, stating that the main premise of absorptive capacity is that prior related knowledge is needed to assimilate and use new knowledge. Thus, knowledge accumulation and experience (Zahra and George, 2002) for the backbone for knowledge acquisition and assimilation. Furthermore, absorptive capacity can play a critical role in explaining learning is easier for some organisations while difficult for some others. The theory asserts that such organisation use methods to ensure their collective internal knowledge retained, training is received for technology built externally, and collaboration is done with partners involved in innovation (Zahra and George, 2002; Cassiman and Veugelers, 2006; Vanhaverbeke *et al.*, 2007; Volberda *et al.*, 2010).

7.4.7 Discussing problems and errors

Discussing and solving problems can create new and innovative ideas if organisations are able to provide an environment where problems and issues are discussed freely and creatively. The findings show that providing an open environment free of criticism and ridicule increases the ability to think freely, which could have a positive impact on learning and knowledge sharing within the ERP implementation. The results of this study revealed that the majority of organisations often hold regular meetings to discuss problems and issues related to the implementation. The purpose of these meetings is resolving and documenting any problem that may have an impact on the ERP implementation. These findings are in agreement with those of Chiva *et al.* (2007), Goh and Richards (1997), Dobni (2008), Robbins *et al.* (2003) and Menon (1995), who indicate that discussing and solving problems can create new and innovative ideas if organisations are able to provide an environment where problems and issues are discussed freely and creatively.

7.4.8 Documentation of knowledge gained

The documentation of knowledge gained from the ERP implementation is found by this study to be an important factor, enabling organisations to successfully implement ERP. Most organisations that have documented their implementation plans encountered problems and anticipated problems, with better ERP abilities in understanding, adapting and using the ERP functions, now and in future upgrades. The implementation problems and other previous experiences on similar or related projects, whether successful or not, need to be documented, and hence codified. This, in turn, contributes to learning and knowledge sharing; it helps to increase efficiency in similar projects, and avoid committing repeated mistakes. These results agree with the findings of other studies (Zahra and George, 2002; Cohen and Levinthal, 1990;

Gupta *et al.,* 2009), in which it was found that codification of knowledge could increase the level of organisations' absorptive capacities. Therefore, it will improve the understanding of new knowledge (Nonaka, 2000; Zollo *et al.,* 2002).

7.4.9 Process and structure to capture new ideas

The results suggest that the interviewed organisations have some kind of structure or process to capture new ideas and improvement suggestions. Most organisations have employed more than one method or tool to allow a smooth flow of ideas. These structures and tools include creating internal websites/portals, ticketing systems for technical support, private social media, and dedicated innovation departments to overlook innovations. The literature findings agree with the importance of having a process and structure to capture new ideas, as an important factor in encouraging learning and knowledge sharing (e.g. Senge, 1990; Leonard-Barton, 1992; Slocum *et al.,* 1994; Sinkula, 1994). Moreover, this openness to new ideas is considered a critical dimension within organisational learning capability (Nevis *et al.,* 1995; Weick and Westley, 1996).

7.4.10 External linkage with other organisations

The findings of this study suggest that external linkage with other organisations is helpful in enabling organisational learning, and consequently the ERP implementation, since the concept of absorptive capacity is dependent on the ability of an organisation to be externally oriented and acquire new knowledge from external sources. Organisations found to have good linkage with other external organisations show stronger understanding and use of the ERP functions. Therefore, openness and exposure to external sources of knowledge are vital to ERP learning and the implementation of ERP systems. These results are in line with those of the previous studies of Chiva *et al.* (2007), Senge (1990), Leonard- Barton (1992), Slocum *et al.* (1994) and Sinkula (1994), who emphasised that external linkage and interaction with other organisations is very helpful in organisational learning.

To summarise, this section discussed the key factors affecting ERP's learning and knowledge sharing are discussed in order to answer the third research question. The outcomes of this study show that ten learning and knowledge sharing factors affect the implementation of an innovation such as ERP, and therefore understanding, adapting and using the ERP functions efficiently. Only one condition was found to inhibit learning and knowledge sharing in the sample organisations: the majority of organisations do not have a clear vision and strategy for ERP learning. On the other hand, the remaining factors are found to enable learning and knowledge sharing. These enablers are learning and development, managerial commitment and support, openness and experimentation, existing and accumulative knowledge, discussing problems and errors, documentation of knowledge gained, process and structure to capture new ideas, and external linkage with other organisations. Table 7.4 summarises the key factors affecting ERP's learning and knowledge sharing in Saudi Arabia.

Table 7.4: Key factors affecting the ERP's learning and knowledge sharing

Key factors	Result found in this study
Understanding, adapting and effectively using the ERP functions	Enabler
Learning and development	Enabler
Managerial commitment and support	Enabler
Openness and experimentation	Enabler
Clear vision and strategy for the ERP learning	Inhibitor
Existing and accumulative ERP knowledge	Enabler
Discussing problems and errors	Enabler
Documentation of knowledge gained	Enabler
Process and structure to capture new ideas	Enabler
External linkage with other organisations	Enabler

7.5 Key Cultural Factors Affecting ERP Learning and Knowledge Sharing

This section is aimed at discussing the investigated key cultural factors affecting ERP learning and knowledge sharing in the sample organisations. In order to answer the fourth research question, this study found five key cultural factors for creating an environment for learning; knowledge and knowledge sharing is critical to effectively manage new processes, routines and norms that are associated with ERP implementation. These factors are organisational culture, participative decision-making culture, dialogue and communications, conflict and debate, and trust. These factors are discussed in the following sections.

7.5.1 Organisational culture

The findings from the analysis chapter show that the culture of individual organisations and the national culture may have effects on the adoption of IT in general, and ERP as well. Moreover, ERP learning, knowledge sharing and the implementation itself could be affected by the organisational culture. The findings show that most interviewees view organisational culture as an important factor that could foster and enhance the ERP implementation. Thus, each organisation may have different characteristics in terms of culture, which are affected by the type of employees and their backgrounds, the regulations and policies of the organisation, the national culture, and the mission type of the organisation. Although some organisations have managed to overcome some cultural aspects, others may find it useful to employ strategies, such as providing training and supporting learning, applying appropriate rules, trust, employee empowerment, and running awareness programmes. These findings reflect those in the literature, as in the research of Schniederjans and Yadav (2013), De Jager (2010), Klein and Knight (2005), Nah *et al.* (2007) and Kalema *et al.* (2014), which highlighted that ERP implementation success is positively associated with organisational culture.

7.5.2 Participative decision-making culture

The findings show that most of the interviewed organisations have taken advantage of participative decision-making approaches to enhance their ERP implementation experience. Empowering employees to make decisions is a culture that has a positive impact on learning, increased employee involvement, job satisfaction and organisational commitment, as confirmed by Daniels and Bailey (1999) and Scott-Ladd and Chan (2004). Therefore, the results of this study are in agreement with Wiewiora *et al.* (2013) and Chiva *et al.* (2007), who state that encouraging employees to participate in the organisation's decision-making process is one of the best solutions for promoting and maintaining continuous learning.

7.5.3 Dialogue and communications

The findings show that most organisations interviewed recognise the importance of communications, and encourage organisation-wide communication regarding ERP implementation. Effective communication is an essential factor for successful ERP implementation (Welti, 1999; Falkowski *et al.,* 1998; Esteves and Pastor, 2001). It is encouraged and sometimes enforced by top management to aid learning and knowledge sharing. In order to facilitate strong communication, organisations need a climate that fosters openness to both internal and external resources of learning, allowing individual knowledge to be constantly renewed, widened and improved (Senge, 1990; Leonard- Barton, 1992; Slocum *et al.,* 1994; Sinkula, 1994). These results are confirmed by a number of studies (e.g. Leonard-Barton, 1985; Dixon, 1997; Isaacs, 2000; Schein, 1993), which consider dialogue and communication among potential adopters to be a major force determining the rate at which the new idea, product or process spreads, thus being vitally important to organisational learning.

7.5.4 Conflict and debate

The findings revealed that, in most cases, top management mainly handles conflicts that result from the implementation of ERP. They bring all parties into an open meeting and encourage dialogue between the two parties to discuss any conflict. Alternatively, other organisations have very limited tolerance for any conflict, where top management intervene and solve the problem themselves. Furthermore, this study found that most organisations solve conflict in a formal manner, where users are not freely and actively debating issues and conflicts, with their views expressed readily and listened to with an open mind, as suggested by the work of Tidd and Bessant (2011). Therefore, this factor was found to hinder the learning and understanding of ERP and knowledge sharing, as confirmed by Alvesson and Willmott (2012).

7.5.5 Trust

The analysis of the data in Chapter Five showed that trust is considered to be one of the most important factors. The findings showed that trust should exist between all ERP stakeholders, the technology (ERP system) and the organisation. Organisations recognised the importance of trust in empowering ideas and people to make changes and push for developments. In addition, they believe that trust should not be limited to the trust between users and top management, but should be the norm for the whole organisation. On the other hand, a lack of trust in management or the system could possibly jeopardise projects and change attempts. Lack of trust can be manifested in a number of ways, for instance, users' fears of replacement or layoff could not only hinder the learning and knowledge sharing process, but also may create ERP implementation resistance. These findings reflect those in the literature, as from the studies of Tushman and Nadler (1986), Tidd and Bessant (2011), Snipes *et al.* (2004), Klein and Knight (2005), Ahmed (1998), Gudmundson *et al.* (2003), Dlodlo (2011), Finger (2005), Hart (2010), Kalema *et al.* (2014) and Singh and Wesson (2009), who identified trust as a key motivating factor for innovation acceptance and its implementation success. Additionally, the findings also reflect studies on the importance of trust in ERP implementation (Schniederjans and Yadav, 2013; Singh and Wesson, 2009; Bock *et al.,* 2005).

In summary, this section discussed the key cultural factors affecting ERP learning and knowledge sharing are discussed in order to answer the fourth research question. The outcomes of this study show that five key cultural factors were found to be important in creating an environment for learning; knowledge and knowledge sharing is critical to effectively manage new processes, routines and norms that are associated with ERP implementation. Only one cultural condition was found to inhibit learning and knowledge sharing in the sample organisations. This shows that the majority of organisations are having difficulties and problems in handling conflicts and debates that arise from the ERP implementation project. On the other hand, the remaining cultural factors were found to be enabling learning and knowledge sharing. These enablers are organisational culture, participative decision-making culture, dialogue and communications, and trust. Table 7.5 summarises the key cultural factors affecting ERP learning and knowledge sharing in Saudi Arabia.

Table 7.5: Key cultural factors affecting ERP learning and knowledge sharing

Key factors	Result found in this study
Organisational culture	Enabler
Participative decision-making culture	Enabler
Dialogue and communications	Enabler
Conflict and debate obstacles	Inhibitor
Trust	Enabler

7.6 ERP Implementation Process Map

As highlighted in the literature review, successful implementation of ERP system can bring about benefits and changes at different levels of the business. These benefits and changes can be either incremental or radical or both. Therefore, it supports the view that ERP can be a radical or an incremental innovation or can be both. Additionally, ERP, as show in Figure 7.1 can also be seen as an innovation, which can either be an organisational, technical, administrative, or process. Each type of ERP as an innovation would require a certain set of capabilities and resources in order to achieve the best-intended goals of its implementation.

In this study, as illustrated in Figure 7.1, the ERP implementation is considered to consist of the following four stages: (1) adoption; (2) adaptation; (3) modification; and (4) re-invention (Saad, 2000). The adoption and the adaptation are concerned with the dynamic changes through continuous alignment between innovation and its environment. Modification, on the other hand, concerns the ability to alter innovation through training and learning, while the re-invention stage refers to "alteration of the original innovation to suit users' needs and ensure sustainability" (Saad, 2000).

This study has identified four main categories of factors, which affect the implementation of ERP. First, the key organisational arrangements which affect ERP implementation, consists of nine factors that are mainly related to the adoption and the adaptation stages of the implementation (ERP system and vendors' selection, prior ERP system, ERP implementation strategy, ERP implementation methods, ERP implementation motives, ERP implementation scope and budgets, ERP project budgeted cost and time, organisational structure and change management). Second, the key factors, which affect the adoption and diffusion of ERP, comprise of five factors that are mainly related to the adoption stage of the ERP implementation as a technical innovation (relative advantage, compatibility, complexity, trialability, and observability). Third, the key cultural factors affecting ERP learning and knowledge sharing (organisational culture, participative decision-making culture, dialogue and communications, conflict and debate obstacle and trust). These five cultural factors affect almost all stages of the ERP implementation, since organisational culture has an important influence on an organisation's innovativeness (Rajapakse, 2012; Ignatiadis, 2007). The literature suggests that ERP implementation success is positively associated with organisational culture (Schniederjans and Yadav, 2013; Bock *et al.,* 2005; De Jager, 2010; Kalema *et al.,* 2014). Finally, the key factors affecting ERP's learning and knowledge sharing, which consists of ten factors that are mainly related to the modification and the re-invention stages (understanding, adapting and effectively using the ERP functions, learning and development, managerial commitment and support, openness and experimentation, clear vision and strategy for ERP learning, existing and accumulative ERP knowledge, discussing problems and errors, documentation of knowledge gained, process and structure to capture new ideas and external linkage with other organisations).

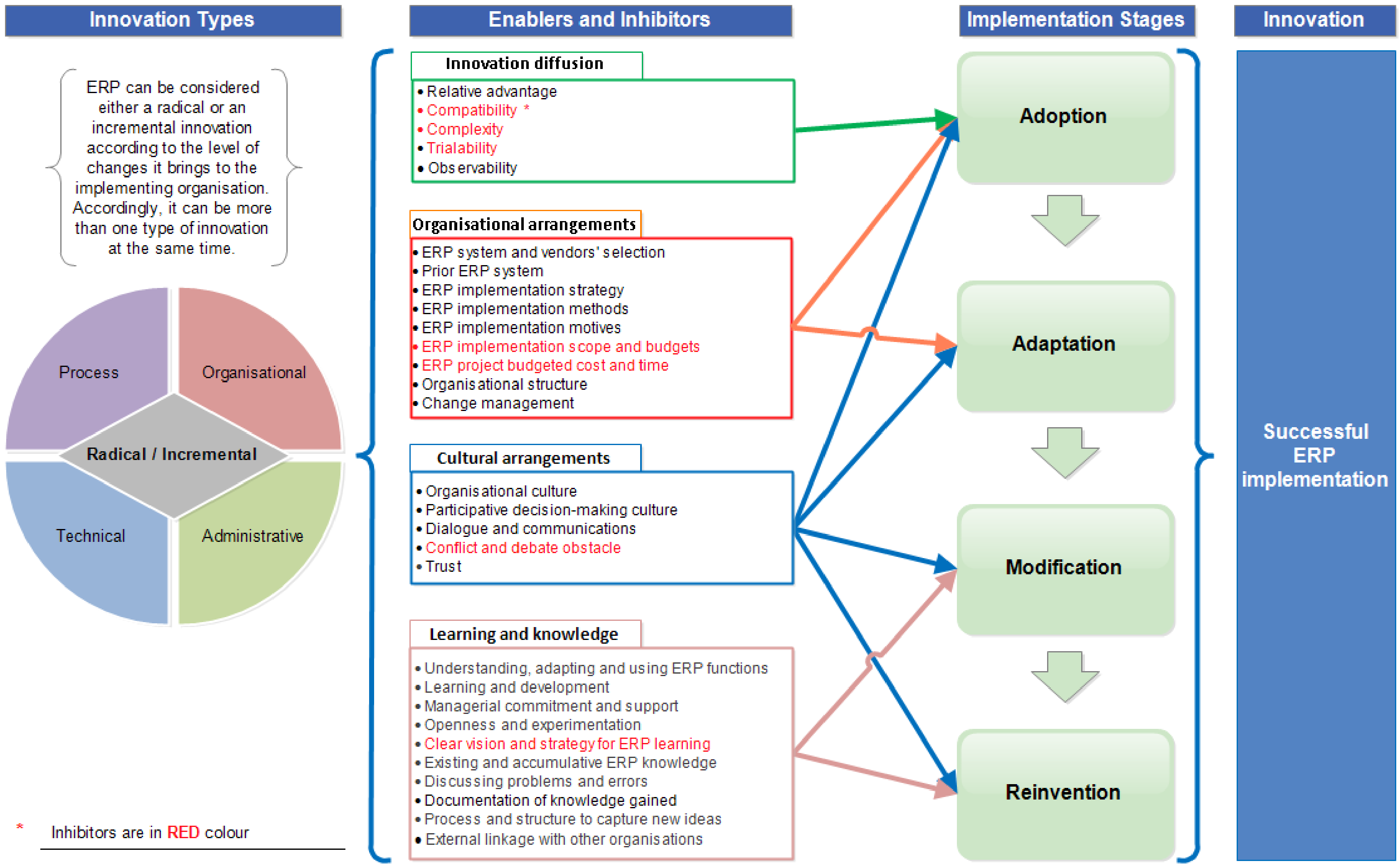


Figure 7.1: ERP implementation prosess map.

7.7 Summary

This chapter has discussed the findings of the analysis constructed in Chapter Six. The discussion and outcomes of this chapter were based on the four main research questions. It discussed the key organisational factors affecting the ERP implementation, the key factors affecting the adoption and diffusion of ERP, the key factors affecting ERP's learning and knowledge sharing, and the key cultural factors affecting ERP learning and knowledge sharing in Saudi Arabia. In addition, the discussion linked the findings of this study to the reviewed and discussed literature findings. It is extremely important that they are taken into consideration in the adoption of ERP not only in Saudi Arabia, but anywhere where similar cultural factors are found. This explains the importance in conducting this study with the qualitative approach, which allows for greater understanding of factors surrounding ERP implementation.

The following chapter summarises and concludes the research's aims, and offers the main research findings; it also provides information about the contributions made by this thesis to the body of theoretical and practical knowledge. Then, an overview of the limitations of this thesis is reviewed, followed by highlighting recommendations and suggestions for future research.

Chapter Eight: Conclusion

8.1 Overview

This closing chapter starts with an overview of this research, followed by the key findings resulting from the empirical study. It also presents and highlights the research limitations and sheds light on areas of future research. Finally, the research implications and its contributions to both theory and practice are detailed at the end of this chapter.

8.2 Overview of the research

Chapter One: This chapter gives a general background of this research and its rationale. It explains why studying ERP implementation as an innovation is important and original. The debate indicates that although implementation has largely been studied but essentially from an information technology (IT) or and information system (IS) perspective but hardly from an innovation and more particularly from the innovation management perspective. In addition this PhD research has focused on the implementation stage process which is described as the heart of the innovation process (Leonard-Barton, 1988 and Saad, 2000) in which a new idea or initiative is either transformed or not into an innovation. This transformation into an innovation is not assured unless certain key factors are fulfilled. The main objective of this research, which viewed ERP as a new initiative used by many organisations in Saudi

Arabia in order to improve their performance and competiveness, was to investigate the key factors for this new initiative to be transformed into innovation and hence deliver its expected benefits. Implementation as a term is broadly used most of the time either to address the technical implementation of ERP systems, or to look at ERP implementation as a representation of the whole ERP lifecycle. The factors for the successful implementation of ERP as a complex innovation were drawn from the extensive review of the literature on innovation and innovation management. This research is therefore contributing to the literature on ERP and innovation and on their implementation in the context of developing countries such as Saudi Arabia. This study is therefore intended to fill this gap. In addition to the aims, objectives, this chapter has also formulated the main research questions that this study has addressed. These questions were related to the investigation of (i) the key organisational factors affecting ERP implementation, (ii) the key factors affecting the adoption and diffusion of ERP, (iii) the key factors affecting ERP's learning and knowledge sharing (i.e. organisational learning which is considered as one of the main factors for the successful implementation of innovation)and (iv) the key cultural factors affecting ERP learning and knowledge sharing.

Chapter Two: The objective of this chapter was to examine the theoretical arguments that have been used to consider ERP as a complex system which entails different types of innovation. This chapter discussed the concept and definition of innovation and its key characteristics. It examined the process of innovation in order to highlight the importance of the implementation stage and identify the main factors for the transformation of an idea into an innovation. Amongst this key condition, the literature review has emphasised the importance of learning in order to develop an appropriate level of absorptive capacity, the need for organisational change, and culture. Chapter Three: This chapter builds on Chapter One and defines ERP for the purpose of this study as a complex system of innovative solutions based on a set of IT business applications. Moreover, the historical development of ERP systems has been discussed to show how these systems have become an integrated complex solution. The key benefits, drawbacks, limitations and characteristics of ERP as an innovation have also been identified in order to better understand the whole process, and more particularly, the stage of implementation. In addition, the key factors for the successful implementation of ERP systems have also been identified. The key motives, stakeholders, strategies and methods of ERP have also been examined in this chapter. In addition, the key findings from chapters one and two were used to form the theoretical basis for the empirical investigation. Chapter Four: This chapter was devoted to the investigation of the Saudi context and identified the main the political, economic, innovative and cultural factors which need to be taken into consideration into consideration in the investigation of the implementation of ERP. Chapter Five: This chapter discussed and justified the research methodology and methods that were selected. The philosophies and theories underpinning the selected methodology and methods were also thoroughly discussed. In addition, this chapter explained how the data were collected and analysed. The evaluation of the research focus and the prevailing methodologies suggested that the interpretivism paradigm was the most suitable approach for the study. By being conceived within the tenet of interpretivism, the study has not only identify the main enablers and inhibitors to ERP implementation, but also refined and redefined the measures for successful implementation – thereby identifying the deeper insights and circumstances required for understanding the effect of learning and knowledge sharing on ERP implementation. Since the field of this study is still under development and started flourishing only recently, semi-structured interviews were chosen to collect the data. Chapter Six: This chapter was focused on the analysis of the qualitative data collected from the interviews. It identified the main factors, enablers and inhibitors for the successful implementation of ERP systems as an innovation. The findings resulted in nineteen main factors, key enablers and inhibitors that were found to be important in this study. These factors were classified according to the research questions. Furthermore, this chapter provided evidence in relation to the key enablers and inhibitors of ERP implementation that were extracted from the interviewees' answers.

Chapter Seven: The objective of this chapter was to discuss the findings of the analysis developed in Chapter Six. It discussed the nine key organisational factors affecting ERP implementation, two of which were found to inhibit ERP implementation. Five key factors affecting the adoption and diffusion of ERP were identified, three of which were found to be inhibitors. This chapter also discussed the nine key factors affecting ERP’s learning and knowledge sharing, one of which was found to be an inhibitor. Finally, this chapter also discussed five key cultural factors affecting ERP learning and knowledge sharing in Saudi Arabia, finding only one factor that was considered to be an inhibitor to ERP implementation.

Chapter Eight: The chapter presents the conclusions of this thesis and provides an overview of the research.

8.3 Key Findings

This study has fulfilled the aim and objectives of this research. The second, third and fourth objectives are fulfilled in Chapters Two, Three and Four. In addition, this section fulfils the first objective, which is the identification of key factors that enable and inhibit ERP implementation as an innovation and their effect on the failure or the success of ERP implementation in Saudi Arabia. The key findings are discussed in the context of the main research questions.

First: Key organisational factors affecting ERP implementation are discussed in order to answer the first research question. The outcome of this study has shown that nine key organisational factors affecting the implementation of an innovation such as ERP were found to be important. Two of these inhibited ERP implementation – ERP implementation scope and budgets, and ERP project budgeted cost and time. The remaining seven factors are found to act as enablers and they help organisations to learn and share knowledge among their users and therefore help ERP implementation. These enablers are ERP systems and vendors' selection, a prior ERP system being in place before implementing ERP, strategies adopted by organisations to acquire and implement the ERP system, implementation motives, organisational structure and change management.

Second: Key factors affecting the adoption and diffusion of ERP are discussed in order to answer the second research question. The outcome of this study has shown that five key innovation diffusion attributes for ERP implementation were found to be important. Three of these inhibited ERP implementation. These are trialability, compatibility and complexity. The remaining two factors were found to enable and help organisations to learn and share knowledge among their users and therefore help ERP implementation. These enablers are ERP relative advantage and observability.

Third: Key factors affecting ERP's learning and knowledge sharing (i.e. organisational learning) were discussed in order to answer the third research question. The outcome of this study has shown that nine learning and knowledge sharing factors affect the implementation of an innovation such as ERP, and therefore understanding, adapting and using the ERP functions efficiently. Only one condition was found to be inhibiting learning and knowledge sharing in the sample organisations. This shows that the majority of organisations do not have a clear vision and strategy for ERP learning. On the other hand, the remaining factors were found to be enabling learning and knowledge sharing. These enablers include learning and development, managerial commitment and support, openness and experimentation, existing and accumulative knowledge, discussing problems and errors, documentation of knowledge gained, process and structure to capture new ideas and external linkage with other organisations.

Fourth: Key cultural factors affecting ERP learning and knowledge sharing were discussed in order to answer the fourth research question. The outcome of this study has shown that five key cultural factors were found to be important in creating an environment for learning. Acquisition of knowledge and knowledge sharing within the organisation were found to be critical for the effective management of new processes, routines and norms associated with ERP implementation. Only one cultural condition was found to inhibit the learning and knowledge sharing in the sample organisations. This has shown that the majority of organisations were having difficulties handling the conflict and debate that arise from ERP implementation projects. On the other hand, the remaining cultural factors were found to be enabling learning and knowledge sharing. These enablers include organisational culture, participative decision-making culture, dialogue, communications and trust.

Table 8.1 summarises the key factors affecting ERP learning and knowledge sharing and ERP implementation, as found in this study.

Table 8.1: Key factors affecting ERP learning and knowledge sharing and ERP implementation

Dimensions	Key factors	Result found in this study
Organisational arrangements	ERP system and vendors' selection	Enabler
	Prior ERP system	Enabler
	ERP implementation strategy	Enabler
	ERP implementation methods	Enabler
	ERP implementation motives	Enabler
	ERP implementation scope and budgets	Inhibitor
	ERP project budgeted cost and time	Inhibitor
	Organisational structure	Enabler
	Change management	Enabler
Innovation diffusion	Relative advantage	Enabler
	Compatibility	Inhibitor
	Complexity	Inhibitor
	Trialability	Inhibitor
	Observability	Enabler
Learning and knowledge sharing	Understanding, adapting and effectively using the ERP functions	Enabler
	Learning and development	Enabler
	Managerial commitment and support	Enabler
	Openness and experimentation	Enabler
	Clear vision and strategy for ERP learning	Inhibitor
	Existing and accumulative ERP knowledge	Enabler
	Discussing problems and errors	Enabler
	Documentation of knowledge gained	Enabler
	Process and structure to capture new ideas	Enabler
	External linkage with other organisations	Enabler
Cultural arrangements	Organisational culture	Enabler
	Participative decision-making culture	Enabler
	Dialogue and communications	Enabler
	Conflict and debate obstacle	Inhibitor
	Trust	Enabler

Source: The researcher

8.4 Contributions

This study is one of the very few studies that investigates ERP implementation as an innovation and is the first study of its kind in Saudi Arabia. This research provides both the theoretical and practical implications of ERP implementation success in general and of Saudi organisations in particular. These practical implications are relevant to managers involved in the management of innovation and ERP. The implications are also relevant to policy makers whose mission is to promote the development of innovation and learning as a means to improve performance and competitiveness.

Contributions to theory

In this context, the general outcomes of this study have contributed and extended knowledge in the field of ERP systems' adoption and implementation. The specific contributions of this thesis are as follows:

First: This study brings new understanding regarding the success of ERP implementation as an innovation through the inclusion of innovation diffusion, learning and knowledge sharing and organisational culture perspectives of success indicators of ERP implementation in Saudi organisations. It enriches the ERP literature by providing a comprehensive insight into the key factors that are considered important for ERP implementation from an innovation point of view. Although the existing literature provides various discussions about the implementation of ERP systems, it provides limited information on the effect of learning and knowledge sharing on the success of ERP implementation.

Second: The research in the ERP implementation spectrum has mostly centred on the technical implementation of ERP systems, implementation as a representation of the whole ERP lifecycle and the general success factors for ERP adoption. However, this research has been enlightened by Saad's (2000) model of the innovation implementation process, which recognises the complexity of innovation implementation, represented by issues such as scarce resources, a lack of skills, scepticism towards formal training, the need for flexibility and a lack of systematic measurement (Freel, 2000; Vossen, 1999). Therefore, as suggested by Jones and Saad (2003), the process of implementation needs to be better linked to the organisation's background and culture in order to ensure compatibility and success. This study has therefore viewed ERP implementation through the sub-stages of innovation implementation (Saad, 2000): adoption, adaptation, modification and re-invention.

Third: This study enriches the ERP literature by highlighting the importance of organisational culture in supporting ERP implementation and learning and knowledge sharing in general, and in Saudi Arabia in particular.

Fourth: This study enriches existing knowledge on ERP implementation by identifying 29 key factors affecting the success of ERP implementation. The majority of these key factors are investigated for the first time in Saudi Arabia. Moreover, this is the first study to highlight organisations' levels of understanding, adoption and use of ERP functions as an enabling factor in ERP implementation in general and in Saudi Arabia in particular. In addition, this study found that organisations' choice of ERP implementation strategies and methods is not related to the sectors or the type of industries they operate in.

Fifth: This study is the first study to highlight the learning strategies and tools that aid ERP learning and knowledge sharing in Saudi organisations.

Sixth: This study increases the understanding of ERP innovation typologies. It proves that ERP implementation can be identified as an organisational technical, administrative or process innovation that can be either a radical or an incremental innovation. Thus, each type often requires a certain set of capabilities and resources to be present and managed in order to achieve the best intended goals of the ERP implementation. Most of the existing literature has identified ERP as a radical innovation (Boudreau and Robey, 1999).

Seventh: The context of this study, Saudi Arabia, could serve as a good representation of both developing countries and emerging economies, and the study could thus be replicated in similar contexts. This, however, does not imply that the study is limited to one context only – it is an addition to the general knowledge on innovation, information technology and information systems' implementation.

Contributions to practice

This study also provides some important guidance to practitioners not only on how to manage ERP implementation projects in an effective manner, but also on how to increase their organisations' ability to understand, adapt and use ERP functions. For instance, in order to ensure successful implementation, practitioners need to pay attention to the learning and knowledge sharing organisational culture.

First: ERP practitioners should look at ERP implementation from the innovation perspective, rather than from purely technical approaches. Organisational learning and knowledge-sharing capabilities, strategies, absorptive capacity and the cultural arrangements that facilitate such capabilities should be assessed and managed well, in order to achieve a successful ERP implementation that increases an organisation’s ability to understand, adapt and use ERP functions efficiently and effectively.

Second: This study provides practitioners with an illustrative ERP implementation process map that would help ERP practitioner in: (1) identifying the type of innovation ERP is for their organisation; (2) determining the effect of the enabling and inhibiting factors on each type of innovation; (3) determining the most appropriate ERP implementation strategy and method; and (4) acknowledging and managing the requirements of capabilities and resources needed in each type of innovation and in each stage of the implementation process in order to achieve the best intended goals of the ERP implementation. Furthermore, ERP practitioner and decisions makers need to ensure that the key enablers are well and strongly developed so that can act as drivers that facilitate a successful implementation. On the other hand, they also need decrease or even eliminate the intensity and impact of the key inhibitors. From a practical perspective, these research findings will help practitioners adopt a holistic approach to the implementation of ERP. It will assist them in recognising the need to identify and manage both the enablers and inhibitors in each key stage of the implementation process. This research also provides practitioners an insight about the key organisational factors that can affect the implementation of ERP. The key organisational factors that found to be essential to the implementation of ERP include ERP system and vendors' selection, prior ERP system, ERP implementation strategy and methods, implementation motives, implementation scope and budgets, organisational structure, and change management. In addition, this study provides practitioners with an illustrative table summarising the key enablers and inhibitors of ERP implementation, so that these can be found easily without the need to go through the whole thesis.

Third: Top management should establish clear learning strategies, rules and regulations, a hierarchical structure and formal and informal communication channels to promote the success indicators that encourage learning and knowledge sharing in general and for ERP implementation in particular. In addition, the budgets and scope planning for ERP implementation should consider training as an important component – although it does not help to reduce users' resistance, it increases an organisation's ability to understand, adapt and use ERP functions efficiently and effectively, thus achieving more benefits from ERP systems.

Fourth: Although the national systems of innovation have not been addressed in the empirical findings, the literature discussion in Chapter Four shows that more consideration needs to be given to managing the input and the output pillars of innovation in Saudi Arabia, as Saudi Arabia is realising little innovation output for its innovation inputs. Therefore, the gap between the inputs and outputs needs some improvements, and investments should be made in the input pillars such as institutions, human capital and research, infrastructure, market sophistication, and business sophistication. This will then be reflected in the innovation output pillars such as knowledge and technology outputs and creative outputs. This, in turn, would increase the country's IT absorptive capacity and its innovation diffusion capabilities. Hence, its innovativeness would increase.

8.5 Limitations and future research

Despite considerable effort having been made to enrich the study by seeking to make several significant contributions from both a theoretical and a practical standpoint, it still has a number of limitations, which need to be considered when using the results of this study. However, most of these limitations could be mitigated, managed and covered in future studies.

First: In terms of contextual aspects, this research only included one economic context. Saudi Arabia as a developing country and emerging economy is the main context of this study. Furthermore, the data were collected in one country, Saudi

Arab, which may affect the generalisability of the findings. Further research could benefit from comparing the findings of this study with those from other developing and developed countries.

Second: This study focuses on a limited number of factors for ERP implementation success. More relevant studies on change management, national and sectorial systems of innovation and leadership management may need to be added to improve the understanding of ERP implementation success in the Saudi context. In addition, future work could explore a specific type of knowledge sharing, such as tacit, implicit or explicit knowledge sharing, and its impact on ERP implementation success.

Third: This study focuses on the ERP implementation stage. Therefore, the other ERP lifecycle stages are not within the focus of this study. Future research could benefit from studying those identified factors in different stages of the ERP lifecycle.

Fourth: The empirical data was collected in late 2015 and early 2016 from organisations that had implemented ERP systems at least prior to 2011, in order to have a clear view of how successful the implementation had been. The interviewees, in this case, might not have recalled all of the aspects of the early stages of the ERP implementation in their organisations. Therefore, researchers in this field may conduct longitudinal studies and record events at different times to improve the level of accuracy in the collected data.

Fifth: The qualitative face-to-face interviews in this study were conducted with 25 senior executives from 25 organisations from both the public and private sectors, covering 12 different industries (banks and financial services, agriculture, education, health and hospitals, hotels and tourism, industry, logistics, military, retail, telecommunication and IT, transportation and real estate). In addition, this study is subjective in nature. Factors such as the respondents' willingness, honesty and sincerity influence the reliability of the findings. Moreover, in this study, there was no attempt to ensure gender balance; therefore, the vast majority of the research sample was male, with only one female in the sample. This is due to the fact that males generally dominate the workforce in Saudi Arabia. Therefore, studies in this area could conduct larger surveys of ERP implementation in order to further test and generalise the results of this study.

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Appendices

Appendix 1: ERP benefits

Benefits Dimensions	ERP Benefits	Selected sources
Operational	Reduction in inventory and production cost	Ragowski and Somers, 2002; Hasan *et al.,* 2011; Umble *et al.*, 2003; Shang and Seddon, 2002; Hawking *et al.,* 2004
	Flexibility, integration and synergy building	Al-Mashari, 2003; Shang, 2002; Gattiker and Goodhue, 2000; Nicolaou, 2004
	Business processes improvement, automation and maintaining management "best practices"	Shang and Seddon, 2002; Al-Mashari, 2003; Parr and Shanks, 2000; Nash, 2000; Gattiker and Goodhue, 2000; Shang, 2002; Davenport, 2000; Cooke and Peterson, 1998; Klaus *et al.*, 2000
	Enable process changes	Shang and Seddon, 2002
	Productivity improvement and cycle time reduction and on-time deliveries	Shang and Seddon, 2002; Bergstrom and Stehn, 2005; Gardiner *et al.,* 2002; Hasan *et al.,* 2011
	Quality improvement	Shang and Seddon, 2002
	Customer service improvement and reduction of customer-service response times	Shang and Seddon, 2002; Muscatello *et al.*, 2003; Rao, 2000; Yen *et al.,* 2002; Amoako-Gyampah, 2007; Wah, 2000; Wright and Wright, 2002; Brown, 1997
	Produce accurate demand forecasts	Hossain *et al.,* 2002
Managerial	Improved information response time and assistance in avoiding redundancy of data and operations	Hossain *et al.*, 2002; Amoako-Gyampah, 2007
	Enhanced reporting function	Shang and Seddon, 2002; Spathis and Constantinides, 2003
	Better resource management	Shang and Seddon, 2002
	Improved decision making and planning and facilitation of day-to-day management	Shang and Seddon, 2002; Siriginidi, 2000; Davenport, 2000; Deloitte Consulting, 1998; Markus and Tanis, 2000; Holland *et al.,* 1999; Cooke and Peterson, 1998; Gartner Group, 1998; Amoako-Gyampah, 2007; Chang, 2004; Umble *et al.* 2003; Yen *et al.,* 2002; Okrent and Vokurka, 2004; Poston and Grabski, 2001
	Promote cooperation, knowledge and expertise and improve performance	Shang and Seddon, 2002; Nicolaou and Bajor, 2004
	Avoiding redundancy of data and operations	Hossain *et al.*, 2002; Amoako-Gyampah, 2007
IT Infrastructure	IT system standardisation	Beheshti, 2006
	Technology upgrade	Shang and Seddon, 2002

	Attain, expand and extend enterprise systems	Shang and Seddon, 2002
	Integration of application	Shang and Seddon, 2002
	Easier maintenance of database	Spathis and Constantinides, 2003
	Business flexibility for current and future changes	Shang and Seddon, 2002
	IT cost reduction	Shang and Seddon, 2002; Ross, 1998
	IT infrastructure capacity improvement	Shang and Seddon, 2002
	Eliminate multiple data sources	Yen *et al.,* 2002; Umble*et al.*, 2003
	Deploy new IS functionality	Ross, 1998
	Ease the flow of information through business functions	Gattiker and Goodhue, 2000
	Enhance working patterns and empower workers	Shang and Seddon, 2002
Strategic	Supporting business growth and business alliance	Shang and Seddon, 2002
	Cost leadership and external linkages	Shang and Seddon, 2002
	Generating product differentiation	Shang and Seddon, 2002
	Building business innovations	Shang and Seddon, 2002
Organisational	Increased profits, ROI and ROA	Hendrick *et al.*, 2007; Hunton *et al.*, 2003
	Increased interaction	Hasan *et al.,* 2011
	Decreases financial cost	Hasan *et al.,* 2011
	Centralised information	Beheshti, 2006
	Business and system change	Shang and Seddon, 2002
	Improve organisational learning	Shang and Seddon, 2002
	Information generation	Spathis and Constantinides, 2003
	Improve working patterns	Shang and Seddon, 2002
	Facilitate organisational learning	Shang and Seddon, 2002
	Empower workers	Shang and Seddon, 2002
	Build common vision	Shang and Seddon, 2002
	Connect stakeholders' interests	Umble *et al.*, 2003; Yen *et al.,* 2002; O'Leary, 2000
	Helps the company to achieve competitive advantage	Bingi *et al.*, 1999
	Useful in integrating companies globally	Bingi *et al.*, 1999; Wah, 2000
	Improve communication	Gibson *et al.,* 1999; Yen *et al.,* 2002
	Enhances the centralisation of administrative activities	Davenport, 1998

Source: The researcher

Appendix 2: Advantages and disadvantages of the ERP implementation strategy.

Strategy/Objectives	Advantages	Disadvantages	Selected sources
Big Bang: All applications and modules are installed simultaneously throughout the organisation.	• No need to have an interface between the old and new system • IT team needs to be prepared and equipped to deal with a high volume of issues in a short space of time • Reduced implementation roll-out time, resulting in lower costs, and transition compressed into a defined time period • Enables ongoing adjustments of the scope of the project • Limited need to maintain and change • Low risks • Functionality linkage • Shorter implementation time • Cost-low	• Risk of the new system becoming inoperable (No going back) • The actual development of the plan is a time-consuming process • Introducing both a technical platform and business process change simultaneously • Failure in one element of the system can often cause problems in other areas and place a strain on the business	Welti, 1999; O'Leary, 2005, Abbas, 2001; Sankar and Rau, 2006; Curko et al, 2012; Curko et al, 2012; Holland and Light, 1999; Welti, 1999; Davenport, 2000; O'Leary, 2000; Khanna and Arneja, 2012; Leon, 2009
Phased: All applications and modules are installed over a period of time, with a scheduled plan of steps to guide transition from old to new.	• Less risk • Employees learn as they go; there is no dip in performance after • More time for users to adapt to the new system • Not a sink or swim environment • Small details and issues can be fixed as you go	• The average time for the entire strategy to be implemented is long • Takes longer to be fully converted • Not as focused as big bang • A state of continuous change can sometimes be disruptive • Higher risk of losing personnel to • Turnover • Heavy use of temporary interface	Abbas, 2011; Sankar and Rau, 2006); Botta- Genoulaz *et al.*, 2005; Alshawi *et al.*, 2004; Curko et al, 2012; Curko et al, 2012; Holland and Light, 1999; Khanna and Arneja, 2012; Leon, 2009; O'Leary 2000; Khanna and Arneja, 2012; Leon, 2009

	• Skills and experience are gained with each step/phase, which can help smoothen the process as you move further along • If anything goes wrong, issues can be contained. It is also easier to temporarily revert back to your old system • Reduces the implementation scope • Minimises the risks associated with installation, customisation and functionality of the ERP system • Modules are installed separately • Enables ongoing adjustments of the scope of the project • Peak resource requirements are less than with Big Bang • Personnel gain knowledge in each phase • Time between development and use is reduced	• Need to maintain and revise legacy • software	
Parallel: Old system and new system run at the same time, users learn the new system while still working on the old, and when requirements for the new system are met, the switch is made.	• The least risky option • Users learn the new system while working on the old • Slower pace than the big bang but faster than a phased roll-out • The new ERP system and the old system work simultaneously • Individual modules can be changed before the date goes live	• Cost of running two systems simultaneously • Most expensive • Employees have to enter data in both systems – this can be inefficient and breed data-entry problems	Abbas, 2011; Khanna and Arneja, 2012; Leon, 2009

Process Line: The old system is modified to the new ERP system in several steps. In the first step, the initial phase 1, or the first product line, along with related assets, is modified into the new ERP system	• The organisation becomes more confident with the new ERP system and there is a higher chance of success • Resources are allocated to more challenging and complex process lines • Can be used to manage similar product lines and process flow	• May cause a delay in implementing some modules • Longer time is needed	Abbas, 2011; Sankar and Rau, 2006; Khanna and Arneja, 2012; Leon, 2009
Hybrid: When more than one EPR implementation strategy is utilised to incorporate the system into existing business processes.	• More than one EPR implementation strategy is utilised to incorporate the system into existing business processes		Khanna and Arneja, 2012; Leon, 2009

Sources: The researcher

Appendix 3: An overview of the major IS research paradigms

Paradigms	Positivism	Critical Realism	Interpretivism	Pragmatism
Ontology: the researcher's view of the nature of reality or being	Reality is external, objective, singular and independent of social actors and the researcher.	Reality is objective. Exists independently of human thoughts and beliefs or knowledge of their existence, but is interpreted through social conditioning.	Subjective, socially constructed and produced, may change, multiple and reinforced by humans through their action and interaction.	External, multiple view chosen to best enable answering of research question.
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Valid knowledge is objectively observable and can be acquired. Empirical testing leads to causal law. The researcher is independent from the research. Only observable phenomena can provide credible data, facts.	Observable phenomena create sensations that are open to misinterpretation. Understanding of the social world from the participants' perspective, through interpretation of their meanings and actions.	Subjective meanings and knowledge are grounded in social and historical practices. Focus upon the details of situation. A researcher interacts with that which is being researched.	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question.
Axiology: the researcher's view of the role of values in research	Value-free, the researcher is unbiased, impersonal and independent of the data and maintains an objective stance.	An acceptance of a certain level of values and biases, the researcher is biased by world views, cultural experiences and upbringing.	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective.	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view.
Methodological	Deductive approach and hypothesis testing, which enables prediction, explanation and generalisations. Quantitative and measurable data. Accurate	Pluralistic approach, methods triangulation. Iterative between observation and theory. Concepts, variables and hypotheses are pre-determined, and they may	Inductive process. Mutual simultaneous shaping of questions during investigation. Emerging design. Categories identified during research process. High validity. Subjective conceptions and	Abductive approach, methods triangulation. Concepts, variables and hypotheses are pre-determined, and they may change and emerge throughout the research.

	assessments of reliability and validity.	change and emerge throughout the research.	interpretations of actors. Accurate through verification.	
Data collection techniques most often used	Highly structured, large samples, direct and measurable, quantitative, but can use qualitative.	Methods chosen must fit the subject matter, triangulation between interviews and survey. All data that is relevant to the subject, quantitative and qualitative).	Small samples, in-depth investigations, qualitative such as semi-structured interviews. Phenomenology (Qualitative).	Mixed or multiple method designs, triangulation, quantitative and qualitative.

Derived from: Saunders (2011), Creswell (2003), James (2002), Hussey and Hussey (1997)

Appendix 4: Interview guide

Interview guide
1. Participant's background **Section purpose:** To check the demographic information. 1.1. Position Title? 1.2. Number of years have you been working for this organisation? 1.3. What sort of qualifications do you have? 1.4. How many years have you had in a direct relation to ERP?
2. Organisation and ERP background and implementation motives **Section Purpose:** To check organisations' ERP background and newness. 2.1. When did you implement the ERP system in your organisation? What year? 2.2. Was this implementation the first time you use ERP in your organisation 2.3. What sort of system/s did you have before you decided to implement the ERP system? 2.4. Why did you change it to the new system? 2.5. Which ERP system do you have now (Baan, SAP, Oracle, etc.)? 2.5.1. Why did you choose this particular system/vendor? 2.5.2. How often do you change your ERP systems?
3. ERP scope **Section Purpose:** To check ERP complexity, scope and innovation type. 3.1. What was the original scope of the ERP implementation in terms of modules, departments, functions, branches and locations? 3.2. Have you changed the scope during the implementation process? Why? 3.3. Was the ERP implementation project finished within the projected budget or had it exceeded the planning budget (e.g. resources allocation: cost, time and staff? Why?
4. ERP benefits **Section purpose:** To check ERP's benefits achieved.

4.1. What are the main benefits of the implementation of ERP System in your organisation?

Note 1: A list of benefits was given to interviewees

4.2. How and why were these benefits achieved?

5. Stakeholders involved in the implementation of ERP

Section Purpose: To check stakeholders' involvement, project management and knowledge and Learning.

5.1. Did you have a formal (written) plan for the implementation?

 5.1.1. What is it?

 5.1.2. What are the main components of the plan?

5.2. What are the different stages (steps) you went through when implementing ERP?

5.3. Who was involved on ERP implementation and what their roles?

5.4. Who was in charge of the implementation process? Why?

6. ERP Implementation Strategy

Section purpose: To check the ERP implementation Strategy.

6.1. Which implementation strategy did you use in implementing ERP?

***Note 3:** ERP implementation strategies will be explained to interviewees (big bang, phased, parallel, process line and hybrid).*

 6.1.1. Why did you choose this particular strategy?

 6.1.2. What preparations did you have in place prior to choosing this strategy?

 6.1.3. How do you view the success of this strategy?

6.2. What are the key issues and problems you encounter using this strategy?

7. ERP implementation methods types

Section purpose: To check organisation readiness and ERP complexity and Implementation Type.

7.1. How ready was your organisation for ERP before actually implementing the ERP system?

7.2. What type of implementation method have you used?

***Note 3**: ERP implementation methods will be explained to interviewees (Comprehensive, Middle Road and Vanilla).* 7.2.1. Why did you choose this particular method? 7.2.2. What preparations did you have in place prior to choosing this method? 7.3. Did you align your procedures according to the ERP system requirement (reengineered your business process (BPR)) or the other way around, you customised ERP to fit your procedures? 7.3.1. How do you view the success of this method?
8. Diffusion of innovation (DOI) Section purpose: To check the attributes of the diffusion of ERP as an innovation. 8.1. Have you tried the new ERP system prior to the actual implementation? 8.1.1. Who tried the system (key users/ top management/ technical staff etc.)? 8.1.2. What was their feedback after trying the ERP? 8.2. Have the outcomes (benefits) of ERP implementation been clear and seen by stakeholders (i.e. top management, departments, users, etc.)? How? 8.3. To what extent ERP systems are radically different from what the organisation had or did before? 8.4. How did your organisation promote the ERP systems within the organisation (i.e. through: workshops, presentations, circulation etc.)?
9. Learning and knowledge sharing Section purpose: to check what has been done to foster learning and knowledge sharing. 9.1. Can you rank (from 1 to 5) how your organisation was able to understand the ERP functions? 9.1.1. What was done to understand these ERP functions? 9.2. Can you rank (from 1 to 5) how your organisation was able to change adapt the ERP functions to better align them with your business? 9.2.1. What was done to adapt the ERP functions and achieve this alignment? 9.3. Can you rank from (from 1 to 5) how your organisation was able to use the ERP functions? 9.3.1. What was done to effectively use the ERP functions in order to enhance your business performance?

9.4.	Do you think cumulative knowledge and experiences, such as top management experience, or skilled staff or the organisation's past and ERP cumulative experience, in your organisation, were able to support the implementation of ERP? How?	
9.5.	What has been done to foster and encourage the spread of Knowledge and learning with regards to ERP implementation in 1) individual level (Staff/users), 2) departmental level (departments/functions) and 3) the organizational level (i.e. organisation wide: creating a climate where providing feedback, making constructive criticism and empowering employees to make decisions) ?	
9.6.	What has been done to prepare users to use ERP?	
	9.6.1.	How is done?
	9.6.2.	How successful was it?
	9.6.3.	Who was involved in this preparation (vendors, consultants, management, etc.)? Why?
9.7.	Had users received training for the ERP use?	
	9.7.1.	What kind of training they had?
	9.7.2.	Who was involved on the training of your staff to use ERP system?
9.8.	How open your organisation for new ideas and suggestions from the ERP employees to improve the ERP use?	
9.9.	Where users encouraged to fully exploring the ERP system? How?	
9.10.	What kind of resources, tools, facilities and procedures were available to learn about using ERP?	

10. Organisational culture

Section purpose: To check culture arraignment that support learning and knowledge sharing

10.1.	What are the main organisational cultural issues that either help or hinder the implementation?	
	10.1.1.	Why?
10.2.	Do you think the current organisational structure was an obstacle or an enabler to the ERP implementation?	
	10.2.1.	Why in both cases?
	10.2.2.	Is it flexible enough to support freedom, provides good managers and staff empowerment and to encourage staff and departments interactions?

10.2.3. How did support your employees to better implement and use ERP

10.3. Does your organisation encourage open communication between departments, users and top management? Why and how?

10.4. Does your organisation have a clear strategy regarding the implementation of innovations such as ERP?

10.4.1. What is it?

10.4.2. How effective it is?

10.4.3. Is there a clear vision and mission?

10.5. Does your organisation encourage employees to take risk, promote idea generation, facilitate and foster continues learning culture, supports change, manage and handle conflict and resolve mistakes in proper ways? How?

10.6. How conflicts between users/departments regarding the ERP implementation were managed?

11. Final thoughts:

Section purpose: To give interviewees a chance to add any important information that was not directly covered previously.

11.1. Did your organisation learn any important lessons from the ERP implementation experience? If so, what would you do differently in a similar future experience?

11.2. Is there anything else that we ought to know about how your organisation implemented the ERP system? Did we miss anything here?

11.3. If we have any follow-up questions, may we contact you by e-mail or telephone?

Interviewee Name:

Email address:

Telephone number:

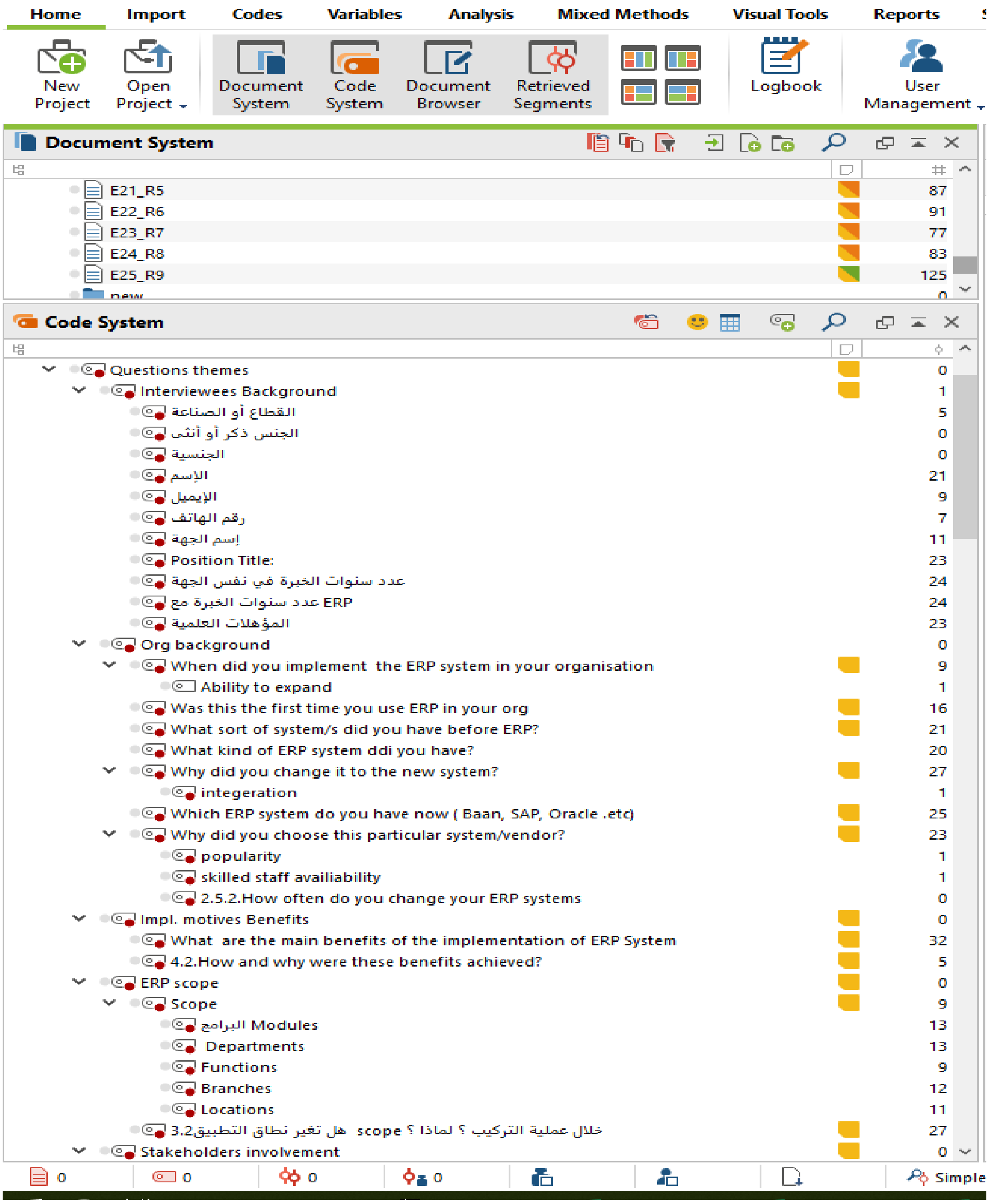
Files names (recording, notes etc.)

Notes:

Appendix 5: Organisations and interviewees background

Intrv Code	Org. code	Position	Yrs W Org	Qualification	Yrs in ERP	Sector	Industry	ERP	Old System	Impl Year	Imp Strategy	Imp. Method	Scope change?	Understand	Change	Use
E16	O1	IT Director	15	BS	5	Private	Industrial	Oracle	Old ERP	1996	Parallel	Comp.	NO	5	5	5
E22	O2	IT Director	20	PhD	7	Gov.	Telecom. & IT	Oracle	Legacy	2010	Hybrid	Vanilla	NO	5	5	3
E12	O3	VP IT	6	PhD	9	Gov.	Education	Oracle	Manual	2011	Parallel	Vanilla	yes	5	5	5
E17	O4	CIO	16	MSc	7	Gov.	Financial Services	Oracle	Manual	2006	Hybrid	Vanilla	yes	5	4	5
E20	O5	IT consultant	18	PhD	7	Gov.	Military	Oracle	Old ERP	2011	Big Bang	Middle road	yes	5	4	4
E24	O6	CIO	6	MBA	5	Private	Financial Services	Oracle	Manual	2009	Phased	Comp	yes	5	4	4
E3	O7	IT Manager	7	BS	6	Private	Real-estate	MS	Old ERP	2008	Phased	Vanilla	yes	5	4	3
E18	O8	IT Director	8	MSc	5	Gov.	Hotel & Tourism	Oracle	Manual	2010	Phased	Vanilla	NO	4	5	5
E10	O9	ERP project manager	8	MS	8	Private	Industrial	Oracle	Old ERP	2009	Hybrid	Vanilla	yes	4	5	5
E13	O10	IT Director	19	MSc	12	Semi-Gov.	Health	Oracle	Legacy	2004	Phased	Middle road	yes	4	4	4
E15	O11	ERP project manager	7	MBA	5	Private	Financial Services	Oracle	Legacy	2009	Phased	Middle road	yes	4	4	4
E2	O12	IT consultant	9	MSc	5	Private	Telecom. & IT	Oracle	Legacy	2009	Parallel	Vanilla	yes	4	3	3
E21	O13	ERP project manager	5	MSc	8	Gov.	Health	Oracle	Legacy	2011	Hybrid	Middle road	yes	4	3	4
E4	O14	ERP project manager	8	BS	5	Private	Agricultural	Oracle	Legacy	2010	Phased	Comp.	yes	4	4	4
E5	O15	ERP project manager	7	BS	7	Semi-Gov.	Health	Oracle	Legacy	2009	Hybrid	Comp.	yes	4	4	3
E6	O16	IT Manager	9	BS	7	Private	Agricultural	In-house	Legacy	2011	Phased	Middle road	yes	4	4	4
E8	O17	CIO	12	BS	6	Private	Retail	In-house	Legacy	2010	Phased	Middle road	yes	4	3	4
E23	O18	CIO	20	BS	13	Private	Logistics	Oracle	Legacy	2010	Big Bang	Vanilla	NO	3	4	3
E25	O19	IT Director	11	MSc	7	Private	Telecom. & IT	Oracle	Manual	2004	Big Bang	Vanilla	NO	3	4	5
E7	O20	IT Manager	10	BS	5	Private	Industrial	SAP	Legacy	2010	Phased	Comp.	NO	3	4	4
E1	O21	IT consultant	6	BS	6	Private	Telecom. & IT	SAP	Legacy	2011	Big Bang	Middle road	yes	3	5	3
E11	O22	IT Manager	5	BS	8	Gov.	Financial Services	Oracle	Legacy	2010	Phased	Vanilla	yes	3	3	3
E14	O23	CIO	13	MBA	7	Private	Telecom. & IT	Oracle	Legacy	2010	Big Bang	Comp.	yes	3	3	3
E19	O24	VP IT	7	MSc	4	Private	Retail	BaaN	Old ERP	2004	Big Bang	Middle road	yes	3	3	3
E9	O25	ERP project manager	10	BS	6	Private	Transportation	MS	Legacy	2008	Big Bang	Vanilla	yes	3	3	3

Appendix 6: MAXQDA Coding Scheme1



Appendix 7: MAXQDA coding scheme2

#	Codes	Sub codes
1	**1- Organisations and Interviewees' Background**	
2		a. Organisation sector and industry
3		b. Organisations sizes
4		c. ERP implementation years
5		d. Organisations' experiences prior to ERP implementation
6		e. Interviewees' positions
7		f. Interviewees' qualifications
8		g. Interviewees' ERP experiences
9	**2- Organisational arrangements**	
10		a. ERP system and vendors' selection
11		b. Prior ERP system
12		c. ERP implementation strategy
13		d. ERP implementation methods
14		e. ERP implementation motives
15		f. ERP implementation scope and budgets
16		g. ERP project budgeted cost and time
17		h. Organisational structure
18		i. Change management
19	**3- Innovation diffusion**	
20		a. Relative advantage
21		b. Compatibility
22		c. Complexity
23		d. Trialability
24		e. Observability
25	**4- Learning and knowledge sharing**	
26		a. Understanding, adapting and effectively using the ERP functions
27		b. Learning and development
28		c. Managerial commitment and support
29		d. Openness and experimentation
30		e. Clear vision and strategy for ERP learning
31		f. Existing and accumulative ERP knowledge
32		g. Discussing problems and errors
33		h. Documentation of knowledge gained
34		i. Process and structure to capture new ideas
35		j. External linkage with other organisations
36	**5- Cultural arrangements**	
37		a. Organisational culture
38		b. Participative decision-making culture
39		c. Dialogue and communications
40		d. Conflict and debate obstacle
41		e. Trust

Appendix 8: Strategies and methods used and organisations' abilities in using ERP systems

Method used	Strategies used	Big Bang			Hybrid			Phased			Parallel		
	Abilities/Levels	3	4	5	3	4	5	3	4	5	3	4	5
Vanilla	Understanding	E23, E25, E9				E10	E17 E22	E11	E18	E3		E2	E12
	Adapting	E9	E23 E25			E17	E10, E22	E11	E3	E18	E2		E12
	Use	E9 E23		E25	E22		E17,E10	E3, E11		E18	E2		E12
Middle-road	Understanding	E1,E19		E20		E21			E13 E8 E15 E6				
	Adapting	E19	E20	E1	E21			E8	E13 E15 E6				
	Use	E1,E19	E20			E21			E13 E15 E6 E8				
Comprehensive	Understanding	E14				E5		E7	E4	E24			E16
	Adapting	E14				E5			E24 E4 E7				E16
	Use	E14			E5				E24 E4 E7				E16