

A model for the implementation of ERP systems in midsize businesses

Fahd Alizai

BCom, MIT, MBus(InfoSys) (VU)

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STATEMENT OF ORIGINALITY

I, Fahd Alizai, declare that this PhD thesis entitled “A model for the implementation of ERP in the midsize businesses” is no more than 100,000 words in length including quotes and excluding tables, figures, appendices, bibliography, references and footnotes. This PhD thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree. I declare that this is my own work, except where otherwise indicated.

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Abstract

This study proposes an Enterprise Resource Planning (ERP) implementation model for midsize businesses. The proposed model uses a strategic approach containing; ERP implementation processes, stages, factors & issues associate with ERP adoption in midsize businesses. This model can be used as part of ERP implementation strategy for midsize businesses, enabling business managers/owner to have better understanding of their implementation process. The model comprises ERP implementation stages and related factors categorised in the Technology, Organisation and People domains.

This study adopts a qualitative research approach and employs an online expert panel along with case study interviews. The first data collection is comprised of an online expert panel, consisting of the experts from different disciplines including ERP academic experts, ERP professionals, midsize business academic and ERP in midsize professionals. The participants were selected from around the world based on their recognised expertise in the relevant areas. The result of the expert panel discussion was used to test and modify the ERP implementation model.

The second data collection process comprised a case study analysis of six organisations. The interviews were conducted amongst small, midsize and a large size business along with one ERP implementer with significant experience in ERP implementation in midsize businesses. The case study results were used to refine the ERP implementation model. The final model makes a theoretical contribution as it links ERP implementation stages and ERP factors for the first time in the context of midsize businesses. The practical contribution includes the use of the model by midsize business owners and managers while performing their ERP implementations.

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Chapter One

Introduction

1.1 Introduction

Midsized businesses play a vital role in the economic development of a nation. They create jobs, boost an economic activity, expedite the economic recovery and are vital for wealth creation (Coyte et al., 2012; Pramukti, 2003) despite their business size (Rovere & Lebre, 1996). Midsized businesses have special significance for developing nations due to their role in economic activity acceleration and the employment opportunities they offer. To increase the production capabilities and business expansion initiatives, midsized businesses need to adopt new technologies that enable innovation and bring efficiencies to their business models.

ERP systems have historically been associated with the large size business implementations. However, there has been a growing trend over the years of midsized businesses considering ERP solutions as a strategic alternative for their technology needs. The adoption of ERP applications has been described as one of the most innovative developments (Al-Mashari 2002) that requires not only the replacement of a legacy system with an enterprise application but also has significant business process change implications (Al-Shamlan et al., 2011). ERP applications integrate major business functions (Koch, 2003) to optimise business process functionality with integrated reporting. With demand saturation of ERP applications in the large size business sector, ERP vendors have changed focus to offer suitable solutions for midsized businesses. Globalisation and new international partnerships are acting as a catalyst for midsized businesses to consider ERP applications. This research investigates the constraints and factors relating to ERP adoption by midsized business for the purpose of developing a practical and viable ERP adoption model that would eventually be of use to midsized business managers considering ERP implementation.

In this chapter, the research problem and its context will be discussed, followed by information on the data collection processes used for this study. The significance of this study along with the structure of the thesis will also be outlined.

1.2 Research problem and context

ERP applications enable midsized businesses to enhance their productivity, improve business practices and collaborate effectively with their suppliers and partners. Due to the size and scale of business operations along with their resource limitations (time, budget and skill); it has been difficult for midsized businesses to consider implementing ERP applications. Some of the challenges faced by midsized businesses when implementing ERP are bad publicity

about ERP implementation failures, business process standardisation expectations (with likely change management implications) and the fear of unknown with limited skills and knowledge to rationally analyse the suitability of ERP application(s). .

ERP systems have an ability to integrate business functions and could bring process efficiencies. Accurate and timely information about customers and suppliers could be readily available using ERP application reporting tools. Additionally, some multinational companies have forced their midsize counterparts to have compatible ERP applications implemented.

It is important as well as difficult for midsize business leaders to take the measures required to have successful ERP applications implementation. The limited knowledge and lack of information on suitable ERP solutions for midsize business requires a comprehensive selection criteria for the applications. In addition, other parameters including affordability, the industry knowledge of the supplier, domestic support availability, technical upgradeability and so forth could be some of the parameters used while selecting a suitable ERP application. Subsequently, an understanding of ERP adoption factors and implementation stages, as well as the relationship amongst the stages and the factors would enhance the understanding of midsize business managers. Hence, a proposed ERP adoption model is developed that enables midsize business leaders to remain in control of their ERP implementation and adoption processes.

1.3 The research study

This study involves two qualitative data collections stages, namely, an expert panel and case study interviews. Each of the stages is discussed below:

Phase One: The Expert Panel

In the first data collection stage, an online expert panel was established, consisting of experts with a wide range of experience in ERP and midsize profession and academia. The feedback received from the expert panel was used to test the proposed model. The experts were selected from different geographic locations: Australia, the United States, Europe, the Middle East and India. The experts were selected based on their practical or academic contribution in the subject field of research. A revised iteration of the model was developed at the end of this data collection stage.

Phase Two: The case study interviews

The purpose of this data collection stage was to further refine ERP implementation model findings by critically analysing the ERP adoption factors based on the experiences of case study organisations that had been involved with at least one ERP implementation. In this stage of the data collection, a total of six case study organisations were interviewed: three midsize businesses, one small size business, one large size along with one implementation services providers. All interviews were conducted in Victoria, Australia.

The revised model from the first data collection stage was presented to the participants for discussion and the comments were recorded based on participant's practical experience. The data was later used to refine the model and resultantly, a final iteration of the model was produced.

1.4 The significance of the study

Generally, ERP Implementation research has been about adoption factors or implementation processes. In this research an attempt was made to combine both streams of research in an innovative manner. The findings of this research are useful for midsize business managers/owners/decision makers intending to implement ERP applications as this group typically have limited knowledge and skills to understand the complexities involved. This research identifies the ERP adoptions factors with reference to their sequence of occurrence in different stages of ERP implementation.

1.5 Structure of thesis

The thesis is structured in eight chapters and three appendixes. The first chapter describes the background information of the study along with overview of research methodology and significance of the research. The second and third chapters consist of a general literature review and the development of the initial version of the ERP adoption model. Chapter four outlines the research methodology applied, followed by Chapter five providing detailed insight on first qualitative data collection; the expert panel. The sixth and seventh chapters contain information on the case study data results, analysis and discussion, followed by the Conclusion chapter. In the appendix section, the first appendix provides information on research publications from this study, followed by material used to contact experts for the expert panel and finally an encapsulated view of the case study material used.

The structure of the thesis is elaborated below:

Chapter One – Introduction

In this chapter, an overview of the research study is provided, along with the research background, context and problem along with the methodologies used for the research. The significance of the study is also presented in this chapter.

Chapter Two – Literature Review Theoretical Foundations

This chapter outlines a theoretical foundation to illustrate key components of the study. The second chapter has two sections. The first section contains definitions of small and medium enterprises (SME), including a distinction made on the different sizes of businesses. It also highlights the significance of SMEs and their operational requirements along with issues they face. The section also highlights the significance of information and communication technologies (ICT) for SMEs and challenges faced by SMEs in relation to ICT adoption.

The latter part of the chapter focuses on Enterprise Resource Planning (ERP) systems. After defining ERP systems, their purpose and benefits are discussed. This is followed by a discussion on ERP selection criteria, adoption and implementation details including ERP project management and risk management. The discussion concludes with an understanding of SME, ERP and ERP adoption requirements in general.

Chapter Three – A model for ERP implementation in midsize

This chapter outlines the fundamentals of the topic being studied, that is, ERP in midsize business. At the start of the chapter, midsize business is defined for the purposes of this research. Later, ERP in midsize businesses is discussed, including the significance of ERP, the barriers of implementing ERP and strategies to overcome those barriers. Furthermore, ERP adoption in midsize businesses along with ERP implementation aspects was examined. Finally, models for ERP implementation were listed and stages of implementation were compared across these models. This discussion led to the development of an initial ERP adoption model for midsize businesses. The discussion concluded with a detailed presentation of the model.

Chapter Four – Research methodology

This chapter outlines the research design and methodology used for this study. It provides details on the research method applied for data collection and the tool and techniques used to evaluate the data. The study involved two data collection stages, an online expert panel, followed by case study interviews. In the online expert panel, a broad range of domestic and international academics and professionals from the ERP and midsize arenas were invited to participate. In the case study analysis, six cases were analysed. Out of six organisations, three were midsize businesses, one was a small business, one was a large business and one was an SME implementer with significant ERP implementation experience. Both data collection stages were used to improve and refine the proposed model content and presentation.

Chapter Five – Expert Panel

This chapter explains the first data collection stage and provides information on the development and execution of the online expert panel. At the start of the chapter the approach used to select and engage with the experts is explained. Then, the structure of discussion is elaborated along with a discussion on the key points discussed. An analysis of the results gathered from the results is provided along with a discussion on the changes in the model as a result of the expert panel findings. The chapter concluded with a revised ERP adoption model.

Chapter Six–Case Study Results and Discussion (Part One)

This chapter provides details of the second stage of data collection. In this chapter, detail of the selection process for case study organisations along with an overview of selected six case organisations is provided. This includes the background of the cases. The outcome of the discussion based on the following ERP implementation stages is then discussed: pre-planning; planning; build; construction; and go live stages. This chapter includes a discussion and analysis for the pre-planning and planning stages of ERP implementation.

Chapter Seven–Case Study Results and Discussion (Part Two)

This chapter is a continuation of the case study data reporting, analysis and discussion. The chapter comprises data reporting, discussion and analysis of the remaining ERP implementation stages: build (set-up, reengineer and system design), construction

(configuration, development and testing) and go live. The data obtained from the six case study organisations was reported and analysed in this stage, along with a presentation of the final ERP implementation model for midsize businesses.

Chapter Eight – Conclusion

In the final chapter of the thesis, an overview of the research and findings is provided. The chapter discusses the theoretical and practical contribution of the study and the research questions, with reference to study findings. The chapter then presents a statement on generalisability, research limitations and suggestions for future research.

Appendix One – Publications

This appendix lists the published research work associated with this study.

Appendix Two - The Expert Panel

This appendix presents relevant templates used to set up the expert panel.

Appendix Three - Case study interviews

This appendix provides the data presentation from transcripts recorded in the Case study interviews.

Chapter Two

Literature Review: Theoretical Foundations

2.1 Introduction

This chapter has two major sections. The first section contains definitions of small and medium enterprise (SME), including the distinction between business sizes. It also provides the operational requirements and issues faced by SMEs when striving to operate in the current diverse socio-economic business environment. It is important to clearly understand the differences between different business types based on their sizes, as literature found to be confusing to categorise businesses between small, medium, midsize and large sizes enterprise. To serve the needs of this research, it was important to identify boundaries within different types of businesses and classify how these businesses would be referred to in the discussion, in accordance with their definitions. The chapter also provides an insight on Information Communication Technologies (ICT) adoption and implementation in SMEs. The purpose of having ICT discussion is to outline benefits of ICT for SMEs and potential barriers to have solutions implemented. In this thesis, ICT and IT (information technology) both terms will be used interchangeably.

The later part of this chapter focuses on Enterprise Resource Planning (ERP) systems, their definition and related content. As the ERP market has evolved and matured, so too has the related hardware and infrastructure technology (Aberdeen 2006). According to Klaus et al. (2000), ERP applications were primarily developed to integrate different department functions and business processes to form a collaborative view of business operations in a single IT architecture. In the early 1990s, ERP systems became the de-facto standard for replacing legacy systems/applications in LEs (Large Enterprises), specifically in multinational companies (Shanks, 2000). Modern day ERP applications are business process centric, evolved to address diverse aspects of corporate business requirements.

2.2 Definitions

2.2.1 Defining SME by number of employees

In attempting to define SME, a distinction needs to be made between small and medium enterprises. What constitutes a small or medium enterprise depends upon the number of employees in an organisation. Different researchers have defined small and medium enterprise in different ways. Burgess (2002) highlighted the difference with reference to a study conducted in 1997 on SME in Europe. Burgess (2002) stated that “*a company having*

10-99 employees is considered to be a small” while, “a company having 100 to 499 employees is considered to be a medium size enterprise”.

Duxbury et al. (2002) indicated that the literature has been divided on how to define small and medium size business. They defined small business as, *“any firm with fewer than 100 full time paid employees”* and divided it into three sub-groups:

- Micro businesses: 2 - 9 employees
- Mid-sized businesses: 10 - 49 employees
- Larger small businesses: 50 – 99 employees.

According to Coyte et al. (2012), SMEs are businesses with less than 200 employees, defined within the following categories:

- 1-4 employees can be considered “micro”
- 5-20 employees can be considered “small”
- 20-199 employees can be considered “medium”

However, Coyte et al. (2012) also argued that in North America and Europe, categories are perceived slightly differently, as follows:

- 1-19 employees as “micro”
- 20-49 employees as “small”
- 50-249 employees as “medium”
- Over 250 employees as “large”

Duxbury et al. (2002) stressed a need for comparison between SME and Large Enterprise (LE), defining SME as any business with 100-500 full time employees and an LE organisation with more than 500 employees.

According to the European Commission [EC] (1996), *“a business must have less than 250 salaried workers to be considered as SME or an organisation that has 49 to 250 paid employees can be considered as Medium sized organisation. If a business is operating with less than ten employees it will be considered as a very small enterprise”.*

The Asia-Pacific Economic Cooperation (APEC) (2003) provided a single standardised definition that could be used across all economies. According to APEC (2003), *“SMEs employ less than 100 people whereas, medium sized SME employs between 20 and 99 people and a*

small firm employs between 5 and 19 and micro firm employs less than 5 people and includes self-employed managers". APEC (2003) further defined SME as an organisation with less than 100 employees but there have been certain exceptions, for instance, there should not be a hard and fast rule that distinguishes a micro firm from a small and medium sized organisation, but in general a micro firm should have less than five employees.

2.2.2 Defining SME by economy

APEC (2003) has extracted data from different sources to explore the perceptions regarding SME in different economies. According to APEC (2003), the definitions of SME change extensively. These definitions could be used mainly for two distinct purposes: statistical and policy or program purposes. The definitions could vary by industry based on their purpose and the common principle of number of employees. Various economies also use capitalisation, assets, sales or turnover and production capacity to define SME.

The EC (1996) also defined SME with reference to the annual turnover of a company. In addition, the EC (1996) stressed consideration of the total of balance sheets and levels of independence of every firm when seeking definitions. It argued:

The final basic criteria for determining whether an organisation is small or medium size depends upon its independence that means a company cannot have 25 percent or more of its control in hands of a large enterprise or jointly held by several large enterprises. (EC, 1996)

Senik et al. (2011) defined SMEs in the Malaysian environment as "a firm with annual sales turnover not exceeding RM25 million (AU\$8 million) and/or full time employees not exceeding 150."

There is a considerable diversity in defining SME. In general, SME is defined as an organisation with less than 100 employees but in some cases (especially in terms of larger economies) the number of employees rises dramatically i.e. from 300 to 500 employees. The data provided by APEC (2003) is presented below in Table 2.1, where x is the number of employees in an organisation.

As illustrated in Table 2.1, definitions of SME cover a range of considerations in different countries. For instance, in Canada, the number of employees would be considered along with the type or nature of the business (i.e. a business specialising in goods would be considered

small if it has 101-500 employees and a business offering services would be seen as a small business if the number of employees is 51-500). Similarly in Chile, the total annual revenue or yearly sales is considered important when defining SME. In Indonesia, assets and annual sales are considered along with the number of employees. In Vietnam, the number of staff along with the capital of an organisation is considered important. In Korea, the type of business (i.e. mining manufacturing, construction and services) is considered important, with the index for the number of employees changing for each business type. Similarly, in Mexico, Russia, Thailand and the USA, the nature of business and the associated number of staff are used to define SME.

Table 2.1: SME with reference to economies APEC (2003)

Country		Micro	Small	Medium
Australia		$x < 5$	$5 < x < 20$	$20 < x < 200$
Canada	Goods	$x < 100$	101 – 500	$x < 500$
	Services	$x < 50$	51 – 500	$x < 500$
Chile	Staff	$x < 4$	$5 < x < 49$	$50 < x < 199$
	Sales	< US\$74,500	< US\$ 776,566	< US\$ 1.5 Million
Indonesia	Staff	$1 < x < 4$	$5 < x < 19$	$20 < x < 99$
	Assets	--	< US\$ 20,000	< US\$ 1,000,000
	Sales		< US\$ 100,000	< US\$ 5,000,000
Korea	Mining, manufacturing		$x < 50$	$50 < x < 300$
	Construction		$x < 30$	$30 < x < 200$
	Services		$x < 10$	$11 < x < 20$
Mexico	Industry	$0 < x < 30$	$31 < x < 100$	$105 < x < 500$
	Commerce	$0 < x < 5$	$6 < x < 20$	$21 < x < 100$
	Service	$0 < x < 20$	$21 < x < 50$	$51 < x < 100$
Russia	Type one	$1 < x < 5$	$10 < x < 49$	$100 < x < 249$
	Type two	$6 < x < 9$	$50 < x < 99$	$250 < x < 500$
Thailand	Staff		$x < 50$	< 20 million Baht
	Assets		$50 < x < 200$	20-100 million Baht
USA	Manufacturing			$x < 500$
	Non manuf.			< US\$ 5M sale PA
Vietnam	Staff		$x < 30$	< D 1 billion
	Capital		$31 < x < 200$	D 1billion – D 4billion

From the above discussion, it is concluded that there are a number of ways to define SMEs; depending upon the region and the researcher's perspective. It is also understood that the definition of SME could change depending upon the perceptions, empowered by other influential factors. These factors could include macroeconomics, government business policy, financial and economic constraints, geographic location and so forth. It may not be appropriate to ignore such critical factors while defining a business entity as small, medium or mid-size.

2.2.3 Difference between SME and LE

SMEs are different from their large counterparts (Coyte et al., 2012). Poddar (2010) argued that SMEs have certain advantages over LEs. These include flexibility in operations, an ability to make rapid decisions and the proximity of their customers. SMEs, by benefiting from these advantages, could provide "*positive externalities*" (Poddar 2010) to national or domestic economies and could add to the business of large size partners. Similarly, Hudson et al. (2001) illustrated some key characteristics that make SME different from LE, such as:

- SMEs may have personalised management with limited devolution of authority
- SMEs may have resource limitations including at management level, human resources and financial sources
- SMEs are prone to rely on a small number of customers and operate in a limited market
- SMEs generally have flat, flexible structures
- SMEs have high innovatory potential
- SMEs generally have a reactive and 'fire-fighting' mentality
- SMEs generally have informal dynamic strategies to operate with. (Coyte et al., 2012)

SME and Midsize

From the literature, it was noted that many researchers use SME as the core terminology however; midsize business gets used a lot by ERP vendors and ERP researchers. Given the fact that the term "SME" has a broader meaning, based on the geographic location, size and number of employees (refer table 2.1); it was important to initiate the discussion with SME related literature before establishing an understanding of midsize businesses in relation to ERP systems.

2.2.4 Redefining SME

For the purpose of this thesis, I will adopt the following definitions:

A small business is defined as:

A business with limited operations consisting of 1-25 full time paid employees and business operations at a small scale with little contribution to the economy.

This definition above is modified in accordance with the geographic location, macroeconomic standing of the country and the annual organisational turnover, in other words:

Small Business = No. of staff + annual turnover + geographic location

A medium sized business is defined as:

A business consisting of 26-50 full time paid staff members, operating in a competitive market with potential to expand.

The above definition is viewed in accordance with the geographical location, macroeconomics and annual turnover of the company, presented as:

Medium Business = No. of staff + annual turnover + geographic location

Based on the literature review and definition(s) of Small and Medium Enterprise (SME), it is understood that the acronym SME has several different meanings based on different parameters including the number of FTE (Full time equivalent) staff, the firm's geographic location and its annual turnover. Therefore, for the purpose of this thesis, the definitions for SME and midsize businesses are clearly illustrated to eradicate any confusion by standardising the unit of analysis (i.e. midsize business) for the study.

2.3 Characteristics of small and medium enterprises

Over the past few decades, the significance of SME has been realised and, as a result, research initiatives analysing this area have risen substantially (Kee, 2013). The performance of the SME sector is closely associated with the economic performance of a nation (Pramukti,

2003). There are significant numbers of SMEs around the world playing a vital role in the economic development of their countries. Wielicki (2010) emphasised that, regardless of the size of an SME, it remains a major generator in terms of economic value. Such businesses have special significance in the third world or developing countries due to their advantages to the economy including, creation of opportunities to accelerate economic activity, generating employment opportunities and supporting industry to boost business (Pramukti, 2003). According to Islam (2011), this vital role that SMEs around the world have been playing in third world economic development has been phenomenal. For example, with reference to a private sector industry survey on Bangladesh SMEs, Islam (2011) argued that the SMEs in the country were contributing 25% towards the Gross Domestic Product (GDP). Developing countries encourage SMEs to enter into global markets by establishing international partnerships and networking with domestic LEs. According to Senik et al. (2011), for example, the Malaysian government helps SMEs to network with local government owned LEs and foreign businesses for the purpose of increasing economic activity, exports and expediting the economic growth of the country. However, Camisón (2010) argued that the disadvantages relating to international business enhancement may outweigh the advantages; therefore, SMEs should be careful while making investment decisions.

Poddar (2010) also argued that SMEs are major contributors to the economic progress and GDP of a nation, offering export and employment opportunities to the country. Many of these businesses could either be family owned enterprises or operate in partnerships. It is also argued, however, that these businesses often lack professional knowledge and experience to run their affairs, resulting in business process inefficiencies and ad-hoc financial practices that cause them to heavily rely on banks for support (Poddar, 2010). Wielicki (2010) argued that the limited productivity of SMEs has been the centre of attention for a number of business researchers.

The technological capabilities of SMEs, including information communication technologies (ICT), relate specifically to growth in terms of production, further investment and innovation. For example, in a third world country like Pakistan, around 85% of the manufacturing concerns are small and medium size, requiring an ongoing technological transition to adopt the latest solutions in order to meet rapidly changing growth expectations (Rauof, 1998).

According to the European Union (EU) (2006), SMEs are considered to be the powerhouses of European economies, constituting 99.8% of the total number of companies in the EU, contributing to employment numbers by two-thirds and around 60% of value adds to the

economy. Additionally, while the significance of SMEs in the economic development of a country is undeniable, these businesses deserve more attention as they create job opportunities and promote economic competitiveness (Rovere et al., 1996).

Coyte et al. (2012) suggested that the past literature on SMEs emphasised their economic significance and how they differ from their larger counterparts. For example, they noted that SMEs gain competitive advantage over their large counterparts by effectively realising and integrating specialised knowledge from external resources (Coyte et al., 2012). Cravo et al. (2012) further added that due to the correlation between economic growth and SME progress, researchers and policy makers have paid special attention to the topic of significance of SMEs within the economy.

2.3.1 Contemporary challenges for SMEs

As indicated earlier, SMEs play a vital role in the economic growth of a country. According to Islam et al. (2011), SMEs operate within different industries, including textiles and apparel, food and beverages, metal products and so forth.

While in developing countries governments tend to assist SMEs, these businesses face several challenges. These challenges can hinder the competitiveness and resilience of organisations. Islam et al. (2011) described these challenges as:

- Difficulties in obtaining funds from financial institutions and/or governments. Generally, a higher rate of interest is charged to SMEs and that could have financial implications for business operability.
- Lack of human capital or required professional human resources. Generally SMEs cannot afford to hire highly professional and competent staff.
- A higher level of bureaucracy in government departments could be considered as another challenge for SMEs operating in developing world.
- Lack of available funds for innovative research and development.
- Significant leaning toward the domestic market and inability to broaden the business view towards the international arena.

Entrepreneurial SMEs face greater challenges that would need to be mitigated. SMEs do not take sufficient precautionary measures or establish appropriate risk management strategies or hire staff, who are skilled in effective risk management. Similarly, the risk levels for SMEs could be higher due to a short span of time between their business decisions and outcomes.

Without appropriate risk mitigation and analytical skills, SMEs are more prone to exposure to unanticipated negative events. Consequently, the risks that SMEs carry have significant implications (Sarbutts, 2003).

Cravo et al. (2012) discussed the challenges faced by Brazilian SMEs and suggested that an SME's ability to perform optimally in a competitive economic environment may not be the result of simply improving staff capabilities and hiring new professionals. For productivity and growth in SMEs, Cravo et al. (2012) argued that the level of institutional quality is also important; therefore, quality standards should be enhanced.

Islam et al. (2011) explained success as the achievements of objectives and stated that success is a critical part of a business life, although it is not always explicitly discussed. Success and failure could be interpreted as outcomes of good or bad management. Furthermore, strategies such as internal cooperation, coordination, consultation, flexibility and performance measures could play a vital role in the success of business operations. Inter-firm cooperation could enable small companies to improve their strategic positioning while focusing on their core business operations and expanding into the international arena. This could be achieved by reducing transactional costs, improving skills and bringing rapid technological change to the organisation (Islam et al., 2011). Poddar (2010) discussed the commonwealth business council (CBC) framework that provides means for effective corporate governance for SMEs. This comprised of policies and practice for SMEs; leadership and structure; strategic planning and monitoring; risk management; people strategies, including the use of external providers for specific skills; controlled environments and processes; and transparency and disclosure. It was argued by Poddar (2010) that the proposed CBC framework is essential to understand and standardise the operations of SMEs, enabling SMEs to operate effectively in a competitive environment.

2.3.2 Strategies for success - SMEs

It has been reported that most of the time; SMEs have high growth rates regardless of their size (Acs, 1990). *Due to the* changing pattern in capitalisation in the Western nations; competition has further increased the significance of SMEs. Furthermore, organisations these days are knowledge-driven and their success and survival depends upon their sense of discovery, creativity, innovation and inventiveness. Consequently, to survive in the competitive environment, it is crucial for businesses to orchestrate and lead innovative change (Poddar 2010).

To operate in a market space successfully, Rovere et al. (1996) argued that SMEs must adopt a number of operational features. These are:

- The business must target a niche market to increase competition.
- Owner/ Manager of the company must be vigilant and flexible while managing the business affairs to mitigate the probability of risk involved.
- There must be a greater number of innovative efforts resulting from the diverse activities and technical capabilities of the company.
- To increase the decision making process there must be a “hands on” management approach.
- There must be ease of management and utilisation with fewer formalities with internal and external information systems.
- The communication and information flow must be timely and effective.
- The workers must be motivated to work.

Similarly, Hirsch (1994) specified some attributes of SMEs that could make them successful:

- Leadership in product variety; the product line and length of the company must be better than their competitors.
- Process innovation; that is, there should be a change in the ways the processes are executed in the company.
- Customisation/ incremental innovation; there should be continuous product development and innovation.
- Low prices and fast delivery; the company can entertain a lot of benefits by lowering the price and making fast delivery of the product.

Sarbutts (2003) further explained that SME management should follow a positive approach towards the operational requirements of their organisation. They should optimally plan, forecast future requirements, and avail themselves of opportunities and improve overall organisational efficiency. In addition, the organisation should consider rewarding executives for their analytical skills rather than just their achievements. SMEs could also consider cloud computing services (Alshamaila, 2013) that would enable SMEs to outsource sophisticated ICT management to an external services provider and obtain hosting services at a fixed or variable annual cost. It was argued that this strategy might maximise the return on investment for SMEs and deliver a competitive advantage in a dynamically expanding business environment (Alshamaila, 2013).

To meet a desired level of productivity, Kuratko et al. (2001) argued that an SME should ensure the quality delivery of its products by adopting process efficiencies in their work practice. Productivity was defined by Kuratko et al. as the ratio of outputs to inputs; when there is higher level of quality, this leads to lesser inputs and reduces the probability of failures. Similarly, a higher level of output is associated with increased demand and improved market standing. Furthermore, Kuratko et al. (2001) presented a framework consisting of seven categories containing quality strategies:

- **Leadership** means guidance that a medium business receives from its management. It could consist of setup or establishment of a system by management to maintain the high expectations and performance, personal development, planning, learning and innovation.
- **Strategic planning** consists of organisational planning and includes the ways a company sets and develops its strategic direction. It also includes development of an operational system that enables business to meet its business and performance requirements.
- **Customer and market focus** starts from building knowledge about the customer, and focusing on complaint resolution to examine a company's performance. It also includes measures to understand the customer and market by evaluating the customer satisfaction data.
- **Information and analysis** monitors the central communication network of a firm. Information is crucial to set the strategic objectives of a company and effective use of information results in a positive impact on its overall performance. The firm needs to collect and evaluate the data containing cost, sales, net income and market share to analyse its performance.
- **Human resource focus** means developing employees in a high performance workplace that enables change. There should be integration between human resource management (HRM) and company operations; it is also important that HRM is associated with the strategic objectives of a company. Smaller firms face more challenges because they often cannot afford to hire professionals to execute their HRM operations.
- **Process management** is another important component that covers process efficiency and effectiveness and it includes task integration from product design to customer services.
- **Business results** contain the data relating to customer satisfaction, company finance, supplier performance and a company's operational specifications. Smaller firms do not

require the information infrastructure or level of sophistication that large firms need, so it is important for small companies to gather the data and develop employees in a way that they will be provided with feedback and become part of the decision making process.

From the above discussion it can be concluded that leadership in SMEs is crucial to ensure effective decision making and to mitigate risks. Leadership comes from the top and establishes performance expectations for teams, including their learning and the development of innovative work practices. The management of a company should provide strategic direction; defining ways the company develops in terms of its capacity and capability to expand its performance and business operations. Furthermore, to effectively compete in the market, it is important to incorporate process efficiencies in service delivery, including task integration and business process innovation. Companies should bring change with the improved incremental innovations along with product development and enhancement. The enhancement could be in the product line and length, delivering quality produce at cheaper prices. It was also suggested to target niche markets for better competition.

Moreover, building knowledge about the market and maintaining a focus on customers and their expectations is important, including introducing ways to record customer satisfaction to ensure retention. To analyse and retain critical information, businesses need systems to record, coordinate and communicate with customers and suppliers. Data analysis and accurate timely information availability is critical for SMEs in their cost, sales, net income and market performance. The SME may not need a sophisticated solution to manage their business data but should have an intelligent business application that would help them gather and present information in a comprehensive and timely fashion.

Human resource development was also indicated as a key component for success. The work force should be motivated and high performing to adopt change. It was also indicated that due to the size of operations of SMEs, it would be difficult for such companies to hire professionals to run their human resource operations.

2.3.3 Section summary

Evidence suggest that defining small and medium enterprise is a diverse topic, mainly dependent upon several internal (organisational) and external (wider economic) influential factors. Before carrying out research that explicitly explores impact of software implementation in SMEs, it is essential to refine the scope of research by defining the size of business in

discussion. This research will focus on businesses containing 50-250 full time paid employees with annual turnover of AUS\$1-10 million. This definition will be revisited in the next chapter to further align it with the research scope. Both small and medium businesses are considered important for the economic growth of a nation. SMEs play vital role toward productivity and generate employment opportunities. Literature suggests that modern SMEs face range of challenges relating to their leadership, market competition, performance capacity and capabilities, effective knowledge management, process automation and management, human resource or staffing, information availability and analysis, strategic vision and planning for the business. By establishing effective strategies to cater for these challenges, SMEs would be able to overcome their weaknesses and establish strategies for success.

2.4 ICT in SMEs

ICT comprises computer software programs, applications, hardware and other tools enabling organisations or individuals to connect and/or exchange information effectively (Keller, 2013; Heeks, 2010). Use of ICT may result in an increase of innovative activities in SMEs (Nguyen, 2009). ICT could assist SMEs to increase their ability to produce new products and services. There have been positive impacts of ICT usage in these organisations, resulting in the modification of management structures and increases in efficiency (Nguyen, 2009; Correa, 1994). Companies that use ICT applications, it is argued, are likely to have advantages over their competitors.

2.4.1 Benefits deriving from ICT solutions

In typical SME sectors, organisations were unaware of the potential benefits of ICT. But, as indicated, the introduction of ICT in SMEs brings operational benefits by enhancing functionality through efficiencies. The latest technological innovations help SMEs improve their business processes, bringing innovative change, expanding operations and adding value (Nguyen, 2009).

Furthermore, ICT technologies enable SMEs to gain competitive advantage over their peers by targeting niche markets, collecting information, and building capacity for rapid decision making (Poddar 2010). When these benefits were realised, SMEs started to improve their competitive advantage (Rovere 1996). According to Nguyen (2009), a competitive advantage is the company's ability to learn from past experiences and use that knowledge to create and sustain its ability to remain ahead of its competitors. ICT has the ability to provide such benefits

to SMEs. The use of advanced ICT setups, such as infrastructure networks, enables SMEs to connect efficiently with their clients, suppliers, banks and other consulting firms. This further stimulates the process of innovation by understanding the true needs and demand of the market. ICT can reduce the dependency of the SME on local markets, by extended sourcing; this may consequently have a positive impact on regional development (*Bianchi 1995*).

For efficiency and gaining a competitive advantage, Kee (2013) suggested that SMEs should leverage their advancements by using latest ICT innovations and develop their resources by using online applications. Caillaud (2001) argued that SMEs must utilise their resources and conduct data exchange both internally and externally. Management business information is critical and provides an opportunity for strategic clarification, supervision of constraints, such as legal and political, performance evaluation, knowledge capitalisation, production process updates and optimised information exchange.

Caillaud (2001) provided solutions to SME manufacturing concerns regarding their production management through the introduction of intranet and extranet systems. These technologies would enable a continuous flow of information inside and outside the organisation, enabling the SME to have better overall control of their operational management. According to Caillaud (2001), this approach has four main objectives: organisational, industrial, economical and informational. It provides benefits to the organisation, including: a continuous flow of information, providing the positive exchange of internal and external data; easy access of information to partners; improved quality for customers by developing information networks with company partners; and economies of scale to have relevant management indicators.

2.4.2 Barriers to implementing ICT solutions

There have been many factors that could affect decision making processes when introducing ICT in SMEs (Nguyen et al., 2013; Rovere, 1996). These factors included lack of resources and accurate information; and the lack of skilled employees and managerial ability to adopt new changes. As already indicated, fast, accurate and technologically advanced ICT infrastructure acquisition is considered important for SMEs. According to Wielicki (2010), for SMEs to bridge the *business digital divide*, barriers to implement ICT in organisations must be eradicated. The digital divide was defined by Wielicki (2010) as the gap between LEs and SMEs in utilising ICT solutions for productivity gains. Similarly (Kee 2013) barriers to implement ICT applications within SME may not lead to greater efficiency or lower the cost. Furthermore, the lack of suitability of an application could be considered as a major barrier for

its implementation in SMEs. According to Nguyen et al. (2013) it is unclear whether SMEs consider ICT adoption to be opportunity or a threat. Evidence does suggest that the adoption rate of ICT has been low and the failure of an implementation has been high.

Poddar (2010) stated that, despite the economic significance of SMEs, they face challenges that prevent them from achieving their full potential. One of the major obstacles, according to Poddar (2010), is the inability of SMEs to access adequate funding and the time to implement ICT applications. Similarly, Wielicki (2010) stated that the research literature highlights the many barriers SMEs face in accessing ICT, which can be categorised as follows:

- Lack of digital experience due to lack of interest, or anxiety and lack of attraction towards new technologies.
- Lack of computer infrastructure and network connections.
- Lack of skill in digital technologies due to insufficient user friendly environments and limited education causing knowledge gaps within internal teams.
- Lack of opportunities to use new IT systems.

A typical ICT environment is complex to manage. It includes the management of software applications, the handling of sophisticated hardware, software and networking infrastructure aspects and requires specialised staff for implementation and management. SMEs often lack resources and, due to their size, tend to avoid ICT infrastructure complexities towards their implementation and effective management (Alshamaila, 2013). Wielicki (2010) provided a list of ICT implementation barriers based on the consulting experiences and literature review analysis. A study was conducted in which participants were asked to assess the degree to which each of the barriers impacted their implementation. The list of barriers is as follows (Wielicki, 2010):

- Lack of funding for ICT;
- Lack of knowledge necessary for implementation;
- Lack of business process understanding;
- Lack of skilled employees;
- Lack of standard operating procedures (SOP);
- Lack of strategic direction for longer term objectives;
- Lack of suitable software that would align with business requirements;
- Lack of planning for information systems in the organisation.

Quayle (2005) conducted an empirical study of 750 SME organisations and suggested that the major barrier in the implementation of ICT in SMEs related to issues of leadership and in appropriate management. It was further concluded that another major barrier for IT adoption/implementation was resistance to change within the organisation. Kee (2013) argued that the inability of SMEs (particularly focussed on small audit firms) to compete with their larger counterparts in relation to their IT investment created potential barriers as well as ineffectiveness and inefficiencies. It was suggested by Kee (2013) that when technical compatibilities and cost-related barriers are addressed appropriately, SMEs could develop the adequate infrastructure for technology adoption.

ICT adoption in SMEs is often executed with minimal and/or improper planning. This results in low implementation success rates. The key reason for failures is the difference between vision and execution strategies. SMEs are prone to have limited knowledge or research about their implementation requirements when planning for the new technologies. This results in an unclear list of expectations that does not align with actual requirements. Some organisations may not have sufficient leverage to expand their resources and implement technology due to a lack of strategic IT vision. Other SMEs may have limited access to capital (finance) or information about IT or technical skills to make informed decisions. Some firms may lack senior management support or competence in project management. They may have insufficient technical or functional skills to complete an IT project. In addition, some highly influential customers might demand certain technical changes resulting in a company rushing into IT implementation without considering the consequences (Nguyen et al., 2013).

2.4.3 ICT adoption

For the purpose of this thesis, adoption means a process by which technology is used to deliver change. Adoption includes the period commencing at the point of a decision being made to adopt, through the implementation phases, until the change is accepted by the business stakeholders.

Many researchers have focused on ICT adoption by SMEs (Kee, 2013). What follows is a discussion on the key factors and strategies relating to ICT adoption that have been developed by different researchers.

ICT adoption could be considered as a stage that leads to successful decision making about acquiring some hardware and/or software technologies. This happens by conducting certain

activities, such as decision making by managerial and professional/technical staff, considering internal and external environments and analysing the existing state of the organisation before adopting a certain technology (Nguyen et al. (2013).

In 1990, a multi-perspective framework using organisational level theory was developed by DePietro et al. (1990) called TOE (representing **T**echnology, **O**rganisational and **E**nvironmental factors). The crux of the TOE framework was that technology innovation and adoption could be influenced by three aspects (Alshamaila, 2013). These are:

- **Technology context** (or factors): comprised of internal and external technologies relating to the organisation, including those technologies already being used by a firm or others available in the market place.
- **Organisational context** (or factors): related to the resources and business characteristics including the size and managerial structure of an organisation.
- **Environmental context** (or factors): referred to an environment in which a company conducts its business operations. These related to elements such as industry, competitors and technology services providers.

According to Islam (2011), small firms must improve their strategic positioning by focusing on core business, reducing transaction costs, learning new skills and by adopting the latest technological innovations. This means that SMEs should identify their ICT requirements and acquire advanced technologies relevant to improve their production capabilities. Kee (2013) argued that due to advancements in ICT and infrastructure innovations, there has been a substantial growth in SME international business initiatives in the past decade.

Other factors affect decision making and the intention to adopt ICT within SMEs. These include: cost benefit analysis; the innovativeness of management; the knowledge, skill, ability, perception and attitude of employees; general acceptance of change; ICT knowledge management; and ICT infrastructure. Nguyen et al. (2013) stated that a decision to adopt ICT applications could also be influenced by external factors, such as external contractors, consultants, partners, suppliers and customers of the business. The most common reason for ICT adoption has been for survival and further growth requirements, or for maintaining competitiveness and enhancing the innovative capacity of the business (Nguyen et al. 2013). Nguyen et al. (2013) presented the following factors to assist businesses in adopting ICT solutions:

- *Organisational* – including management, staff, culture and knowledge of the organisation.
- *Network orientation* – including networking with the suppliers, partners and customers.
- *External ICT resources* – including experts or consultants.
- *Internal ICT resources* – including ICT capable, competent staff with capacity to optimally perform.

These factors may assist in predicting the success of ICT adoption in SMEs. Alshamaila (2013) argued that if scalable technologies are adopted by SMEs, those businesses would be able to offer products and service that their large counterparts have been delivering over the years and become more competitive. While adopting ICT solutions, SMEs would require special attention as they are different from LEs. The argument was supported by stating that the size of a business could be one factor for adopting enterprise applications while in LEs their formal systems play a vital role in structuring and implementing organisational strategy. In SMEs, the coordination and control takes place in informal but frequent interactions (Coyte et al., 2012).

Quayle (2005) argued that based on the strategy and goals of an organisation, it might be important for a firm to consider other attributes. These included: implementation speed; cost management (price and payment) structure; external outsourcing of hardware (external hosting including cloud-based solutions); an ability to integrate with the latest technologies; further development plans for enhancement; existing infrastructure installed; and the financial viability of the firm. It was noted that it is important to test any new IT application thoroughly by initiating pilot programs with real suppliers and non-essential goods (Quayle, 2005).

Kee (2013) suggested a number of relevant factors for ICT adoption, with some considered more important than others. The factors considered most critical include: online communication; international exposure and experience; competitive pressures; and the size of firm. Likewise, Nguyen et al. (2013) analysed factors that drive IT adoption along with those factors that lead to successful implementation of IT solutions in small businesses. It was argued that customers could be a major driving force for IT adoption in SMEs. It was also noted that the research indicates that SMEs could be considered risk adverse and that IT adoption should happen for a reason and not merely because of a desire for change (Nguyen, 2009).

2.4.4 ICT implementation

For the purpose of this study, implementation means a step-by-step process to acquire a new technology solution, starting from project inception (start-up) through to delivery ('go live').

Barad et al. (2001) highlighted the significance of advanced technologies for SMEs by illustrating the benefits of technology for production capabilities and the development of quality products at a lower cost due to efficient customer delivery services. Furthermore, Barad et al. (2001) proposed a series of steps for SMEs to follow (listed below) in order to achieve a level of productivity competence. These steps would depend upon design; manufacturing and administration based decisions and should consider issues around improvement in quality of products, process efficiency, having better control over operations, logistics, and better communications. Barad et al. further argued that the SMEs may not be able to afford a comprehensive departmental setup with educated staff or trained professionals and might not be able to bear large investment costs to improve their current business structures. They might also be reluctant to invest in the latest technologies and would require support to define specific technological requirements to target a right solution as per their needs (Barad et al., 2001). Barad claimed that below steps could help lead SMEs towards successful IT implementation;

- ***Strategic priorities*** to be defined that could provide competitive advantages to medium businesses, including: product pricing, efficient delivery procedures, standards for high quality (designs and product) and staff involvement in all processes and so forth. There is a greater probability of effective efforts made by staff when the workforce is highly committed and dedicated to the company.
- ***Regarding concerns to improve*** the systems that have unsatisfactory needs, were further sub-divided into the following:
 - ***Strategic and operational concerns and strategic priorities*** are all different from each other except they are all relate to same performance level such as, cost, time, quality and human performance.
- ***Improvement needs*** of the existing system could depend on the strategic priorities of the organisation. It is perceived that higher the level of strategic priority, greater the improvement needs will be.

Quayle (2005) explained some important factors that must be considered while implementing ICT solutions within SMEs. These factors include, gaining the support from financial and ICT departments within the firm. A steering committee should be set up with an appropriate reporting structure and a procurement strategy established. This group should meet regularly to monitor the progress and allocate the responsibilities with timelines for project implementation. Quayle also suggested that there should be a clear target for return on investment (ROI), which should cover the total capital expenditure cost, the cost of technology, internal resources and time for the implementation. It was further suggested that a project manager should be appointed to drive the project and control the internal resources and external contractors for effectively gathering knowledge and information on best practice for implementation (Quayle, 2005).

As indicated earlier, Nguyen et al. (2013) suggested a number of ICT adoption factors or dependent variables that could assist with measuring the success of ICT implementation in SMEs. Indicators of successful implementation could include ROI, increase in revenue and sales, and/or improvement in the quality of products and/or services. Furthermore, it was argued that organisational factors should be either directly or indirectly related to the successful implementation of ICT within SMEs. In addition, the involvement of staff and management for effective knowledge transfer and knowledge sharing is also vital for the success of ICT implementation. SMEs should also include their customers and suppliers in the communication strategy to coordinate their ICT application change (Nguyen et al., 2013).

2.4.5 Section summary

ICT can potentially bring many benefits to SMEs including, ease of business management, latest technology features, gaining competitive advantage, effective utilisation of resources, an effective data exchange between suppliers and customers and an ability to have accurate and timely information for business decision making. It was noted that SMEs suffer from internal challenges, restricting them to implement ICT solutions including, lack of resources (budgets, time, and skills), lack of ICT infrastructure, lack of accurate and timely information for decision making, employee resistance to change, lack of knowledge management and retention, lack of interest of staff in digital technologies, lack of business process understanding and optimisation initiatives, lack of skilled employee and lack of strategic direction, management or leadership issues.

The adoption of ICT solutions considered is another challenge. Even though scalable technologies would enable SMEs to offer products and services in parallel with their large counterparts, it would always be difficult for SMEs to adopt change. The adoption could be influenced by a technology shift or organisational requirements or the environmental/market expectations. The change adoption transition leap from an existing to a desired state would face significant implications at organisational, technical and resource levels.

While implementing an ICT solution, SMEs should align their strategic priorities, improve processes and ensure an appropriate return on investment for an informed decision. The cost of implementation and technology, management and staff attitudes, training and knowledge transfer requirements, effective planning and leadership are some of the key factors associated with the success of an ICT implementation.

2.5 Enterprise Resource Planning

This section will focus on Enterprise Resource Planning (ERP) systems. It will start with defining ERP, followed by the history of ERP; highlighting a need for the ERP systems and the issues relating to their implementation. Furthermore, ERP vendors and solutions (both technical and functional) will be discussed followed by ERP system features, attributes, their benefits and barriers to implement. A discussion on ERP adoption and implementation will follow providing importance of ERP strategic planning; a need for establishing selection criteria, project management including a component of risk management and finally benefits of lessons learnt will be discussed.

2.5.1 Definitions of ERP

The research literature highlights different points of view in exploring the ERP concept. According to Al-Mashari (2002), an ERP system is the most innovative development in an IT sector. Chung (1999) argues that ERP not only indicates definite objects, it is also a category identifying a range of identical products under one umbrella. Klaus et al., (2000) provided different perceptions about ERP including, an initial and clearly visible perspective of ERP is as a software application product or commodity. Likewise, ERP can be seen as a development tool that integrates all processes and data in one inclusive structure. Finally, another point of view is that ERP is an “*element of infrastructure*” that offers business solutions (Klaus et al., 2000).

Koch (2003) explains that ERP software combines and integrates all the major functions of several different departments and presents them in a uniform, integrated way. ERP systems are information systems that manage business functions using such application modules as customer relationship management (CRM), supply chain management (SCM), manufacturing, finance and human resources (Rooney et al, 2000; Hoch & Dulebohn, 2012). This helps the organisation to carry out its operations in a more effective and efficient way and the software serve the needs of people working in different but virtually integrated departments. Marnewick et al. (2005) defined ERP as a business software package that allows the organisation to automate and integrate the majority of its business processes and share common data and practice throughout the organisation. This should produce and allow access to information in a real-time environment with appropriate information entered only once in the system.

The following are additional definitions of ERP within the literature:

Enterprise Resource Planning systems are comprehensive packaged software solutions; that try to integrate a complete range of business processes and functions to form a complete view of business operations in one Information and IT architecture.
(Klaus et al., 2000)

A software solution integrating the various functional spheres in an organisation - a link through the entire supply chain, aimed at adapting best industry and management practices for providing the right product at the right place at the right time at least cost.
(Rao, 2000)

A system that integrates a set of programs, providing support for core organisational activities such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources. It also helps different parts of the organisation share data and knowledge, reduces costs, and improves management of business processes.
(Aladwani, 2001)

Ross et al. (2006) defined ERP as a business management system that comprises an integrated set of comprehensive software modules. These modules could be used to manage and integrate all business functions within an organisation using a rationalised data architecture characterised by core process integration and shared product and/or customisation databases. The concept of enterprise integration has been commonly used to define ERP (Klaus et al., 2000). Rooney et al. (2000) defined the ERP system as “*An IT tool that helps to plan and use the company’s resources*”.

According to Rosa et al. (2012), ERP systems use “*current off the shelf (COTS)*” software, designed to integrate all core functions of an enterprise on a unified database, regardless of the type, size or nature of the business. Furthermore, Rosa et al (2012) stated that the term ERP originated with the Gartner Group over two decades earlier as outgrowth of manufacturing resource planning (MRP). Similarly, Silva (2012) defined ERP systems as highly configurable off the shelf software packages that integrate systems and information resources to facilitate and coordinate a range of operational and management activities.

For the purpose of this study, the researcher will adopt following definition for ERP systems:

ERP systems are highly sophisticated business management applications that have a number of tasks and objectives to achieve. These are:

- ***Data integration and consistency.***
- ***Business process integration.***
- ***Provision of department specific, timely and accurate information as requested.***
- ***Cost effect knowledge sharing among different departments.***

It can be concluded that there are two aspects of the above ERP definitions. The first relates to the major function of ERP, including production planning and all other relevant activities, such as purchase, inventory and cost optimisation of shipping services and so forth. The second part relates to defining an ERP system as an IT tool. It is also important to note that the implementation process of ERP systems is dynamic with changing business requirements.

2.6 Significance of ERP

This section provides a brief insight into the history of ERP and discusses its significance and benefits. It also outlines ERP features and attributes, including functional and technical features, and provides some available ERP solutions.

2.6.1 The History of ERP

There are different opinions about ERP evolution, one of which is that it is derived from terms MRP and MRPII, which are described as follows:

MRP - Material Requirement Planning: A business application that was designed first in the 1950s to enable companies to reorder material based on past usage. In the 1970s this software was upgraded enabling companies to plan material requirements based on future product requirements. (Orlicky, 1975)

MRPII - Manufacturing Resource Planning: The development of MRPII enabled companies to further extend the planning and control activities to include production planning, business planning, financial and distribution systems in one computer system. (Wallace, 1990)

MRP was developed to meet business requirements and MRPII brought additional functionalities such as sales, planning and capacity management and so forth. MRPII is considered to be the first logical step towards effective manufacturing planning because companies started realising that customer satisfaction and profitability were important features, along with HR, distribution, finance, and manufacturing. CIM is considered to be the next step in a comprehensive technical framework and is described as follows:

CIM - Computer Integrated Manufacturing: The entire conceptual framework for the integration of all business administrative and technical functions of a company. (Klaus et al., 2000)

As indicated, some consider MRPII to be precursor of ERP software. Davenport (1996), for example, stated that the ERP system is a turbocharged version of MRPII, modified and strengthened to help manufacturers face the competitive challenges of 1990s. Al-Mashari (2002) also supported the idea that the ERP system is an advanced version of the MRP system of the 1970s and the MRPII system of 1980s. He further stated that the MRPII model was adopted by major ERP vendors to develop manufacturing and planning components.

It was further argued by Kennerley et al. (2001) that the origin of ERP started from the development of standard systems. Initially these systems were manual until the reorder point and economic order quantity techniques (EOQ) were introduced. The development of MRP grew from this and was another major step that enabled the planning of material requirements. The development of MRPII further enhanced the planning and control activities to include production, business and financial planning. ERP systems were developed as a standard to support all business functions (Kennerley et al., 2001).

In contrast to the views above, some researchers (Glass as quoted by Klaus et al., (2000) pp 157) are of the view that the idea that ERP systems developed from MRP is a false assumption.

Billions of dollars have been invested in the adoption of ERP applications in the last two decades. Al-Mashari (2002) reported that approximately US\$72.63 billion were spent in 2002 on ERP adoption and the trend continued through to projections that US\$23.3 billion would be spent in 2011 (Rosa et al., 2012). Earlier, Carlino et al. (2000) suggested that an estimate \$300 billion was invested globally on ERP systems in the previous years. Rosa et al. (2012) argued that the ERP market continues to grow around the world while ERP software has been the largest segment of the enterprise application market.

According to Rosa et al. (2012) the ERP software revenue will continue to grow substantially over the years and it will be indeed interesting to see the ERP market growing while ERP implementation projects blowing their budgets and facing schedule overruns. A recent survey, according to Rosa et al. (2012), indicates that out of 187 companies tested about their ERP implementation experiences, 61% exceed the schedule timeline and 74% exceed the allocated budgetary allocations. This reflects the potential and willingness of companies to adopt ERP but their lack of ability to effectively implement ERP and enjoy their ERP implementation experiences efficaciously.

2.6.2 ERP vendors and ERP solutions

There are a number of companies that provide enterprise resource management software to help businesses around the world integrate their production, information and planning. In the ERP software industry, the main player is Germany's SAP. It is reported that SAP had €17 billion (AU\$25 billion) gross revenue in 2013 with €5.9 billion (AU\$8.96 billion) net income and had €16.3 billion revenue and earned €5.1 billion net operating profit (SAP 2013). In contrast, in 2002 SAP reported \$7 billion gross revenue (Saccomano, 2003) that represents a significant rise in the revenue and company profits generation for the company, primarily due to technology optimisation and market expansion (SAP 2013). Klaus et al. (2000) described ERP as software that represented a new class in packaged applications, comprising a multi-billion dollar industry. With the latest innovations such as cloud subscription support services this enabled large vendors to expand their market share and penetrate into the midsize market (Nguyen et. al, 2014).

Some of the key ERP vendors include Microsoft, SAP, People Soft, Oracle Corp, Baan and J. D. Edwards. However Parveen & Maimani (2014) argued that SAP rank highest with more than fifth (24%) market share, while Oracle has 18% and Microsoft has only 11% of the total market share. It is also evident from the literature that ERP vendors are strongly committed to invest in application R&D (research and development) for product optimisation and functionality enhancements. For instance, SAP increased its R&D expenses from €2.261 billion in 2012 to €2.282 billion in 2013 that comprised 13.6% of the total revenue in 2013 (SAP 2013).

In the past, ERP vendors tried to maximize their market share by acquiring their rivals. For example, PeopleSoft Inc. acquired its rival J.D. Edwards & Co. for \$1.7 billion in stock in 2003. Later in the same year, Oracle Corp indicated its interest in taking over PeopleSoft for \$5.1

billion in cash (Saccomano, 2003). Oracle did make bids for a hostile corporate takeover of PeopleSoft in 2003 and 2004. Finally, in 2005, Oracle acquired PeopleSoft for US\$10.3 billion, providing Oracle credibility in the ERP applications market (Chatterjee 2007, Millstone 2007).

This reflects the aggressive nature of ERP vendors who have sought to maximise their market share for productivity gains and profits. There are also other ERP vendors trying to increase their market share, such as IBM, but SAP and Oracle remain the major players in the market (Chatterjee, 2007; Saccomano, 2003).

2.6.3 Features and attributes of ERP

Functional features

ERP is not just software, it comprises different components. To make an ERP project a success there is a need to highlight the understanding and integration of these components (Marnewick et al., 2005). Boubekri (2001) indicated that, to achieve long term business objectives, ERP provides large, complex, and integrated systems that add up to business success.

Generally, as already indicated, ERP applications are implemented to integrate information systems across the organisation's core functional areas (Hoch & Dulebohn, 2012). This should facilitate and manage the flow of information within different functions of the organisation and across stakeholder groups. While implementing ERP applications, Rao (2000) suggested that at the end of the requirements gathering phase, customers should be provided with functionality support to manage their business process gaps effectively with standardised ERP processes. It was argued that this gap assistance should be in accordance with the best practice "off the shelf" delivered functionality and enhancement offered. The customer should also be allowed to review and approve or amend the business process customisation list to meet their business functional requirements (Rao 2000).

ERP applications are different from DBMS (database management systems) or OS (operating systems); however, DBMS and OS are vital to ERP systems. The following has been summarised from Rao (2000):

DBMS software is used to create and maintain a database. It provides a layer of transparency between the physical data and application programs.

OS software is designed to control the hardware of a specific data-processing system (computer) in order to allow users and application programs to employ it easily. The most common examples of OS (at the time) were DOS, Windows 95, 98, 2000, XP, UNIX, Linux and so forth.

An ERP system standardises business operations including, production planning, manufacturing, purchasing, marketing, human resource and so forth into number of modules (Boubekri, 2001). The application modules integrate with supported business functions, data and functional processes that get replaced/ improved by ERP business and administrative functionality. These modules include: supply chain management, accounting and finance, human resource management, customer relationship management, inventory management, material management, logistics, maintenance, sales, production, distribution, procurement, asset and cash management, financial accounting, strategic planning, quality management and so forth (Klaus et al., 2000, Boubekri, 2001). Similarly, Koch (2003) argued that ERP applications would deliver combined benefits to their employees working in different departments such as finance, human resource and warehouse due to platform uniformity. In a normal scenario, every department has its own independent computer system specifically programmed to perform a certain set of activities related to the department. These independent systems can help with coordination and intercommunication issues across different departments. ERP applications enable and provide solutions by combining activities and creating a single integrated database, enabling different departments to access and share valuable information consistently (Koch, 2003).

ERP vendors even support customised industry functions such as, 'student management systems' for universities, 'patient management' for hospitals and so forth. There are two ways ERP can target multiple industries: through the ability to support different industries within one solution or preconfigured enterprise individual solutions. For example, PeopleSoft targets industries including financial services, health care, higher education, manufacturing, retail and service industries, as well as federal governments with preconfigured solutions (Klaus et al., 2000). ERP systems can also help to reduce the manufacturing cost when demand exceeds the capacity and it is seasonal. However, when processes are not conceptually integrated then implementing ERP may make the situation worse (Rooney et al. 2000).

Along with a lot of other important features, repetition of use and frequency are two vital features of ERP systems. Recurring business processes, such as procurement, payment and

sales order processing are supported by ERP along with less structured processes like marketing, project management and product development (Klaus et al. 2000).

Technical features

ERP systems are comprised of client server architecture including databases, applications and presentations that make three logical independent levels. The master and transactional data is stored with consistency and redundancy control into an integrated database. The Graphical User Interface (GUI) feature of ERP systems provides a user-friendly and effective interface. The GUI overlays the complications of ERP applications and enables end users to see a single platform for interaction, regardless of which module is being used, as summarised from Klaus et al (2000):

GUI (Graphical User Interface): GUI techniques allow users to interact with software applications by using visually understandable computer graphics that are easy to interact with and operate.

Rao (2000) argued that technological advances are based on two eras: mainframe computing or the client server era and the Internet era. Rao (2000) further explained that primarily ERP systems have been client server based applications; developed and separated on functionality grounds. GUI technology developed on client machines and powerful servers were used to host databases and business logic procedures. The product architecture divides the business logic to execute products on client, server or on both. Relational Database Management Systems (RDBMS) logic provides flexibility in business logic and enables parallel business operation implementation. The following is summarized from Rao (2000):

RDBMS (Rational Database Management Systems): RDBMS is a database system that supports access of multiple distributed data sources and allows synchronising of data manipulation across these sources.

Customisation of products to meet customer demands has become easier due to object oriented development of the system. These technologies have enabled the system to install and customise in a short period of time (Rao, 2000).

In the case of ERP systems, it is more complicated to evaluate efficiency than effectiveness. The reason behind this complication is because the level of transaction handling differs from company to company, depending upon the size of the business. Most ERP solutions run under Windows platform or Unix and Linux operating system. The complexity of the ERP system

requires a sufficient amount of administration that includes database configuration, system monitoring, user administration and so forth (Klaus et al., 2000).

2.6.4 Summary

The literature considers ERP applications being the most innovative development in the ICT sector, yet due to their complexity and significant business process change and infrastructure requirements, ERP applications are considered an expensive alternative. ERP systems provide data integrity, interface uniformity and integration that are critical deliverables for timely and accurate information for reporting. The literature argues differently on the history of ERP, as some researchers believe ERP as an extension of MRP and MRPII while others do not accept this notion. ERP applications are either vendor based standardised applications or an open source application, developed to meet specific sector requirements. Major players in ERP include SAP, Oracle Corporation (PeopleSoft, J.D. Edwards) and Microsoft.

ERP applications comprise different modules and each module provides specific organisational functions such as, financial management, human resource management, customer relationship management, material management, logistics, maintenance, sales and distribution, warehouse management, procurements, asset and cash management, project management and so forth. These functional modules provide an integrated service to the organisation using a GUI interface and are hosted on central RDMS. ERP systems have an ability to provide accurate and timely reporting for effective decision making that is considered to be an important business requirement.

2.7 Benefits and challenges of ERP

In this section, modern day challenges relating to ERP are discussed. This section also provides an insight into the benefits of ERP applications and the barriers to implementing them. In addition, the requirements of ERP are discussed along with factors relating to ERP adoption.

2.7.1 Benefits derived from ERP applications

ERP systems are integrated software developed to handle multiple corporate functions. In effect, ERP can greatly assist organisations to carry out their operations in more effective and efficient ways and allow the workforce to interact and collaborate in an information-enabled

environment (Amoako-Gyampah, 2007). Rao (2000) argued that ERP systems could help make organisations more customer-centric. Simple enhancements within existing business functions could drive benefits such as profitability because of improved, accurate data about valued customers (Rao, 2000). ERP systems enable companies to analyse their customers based on different attributes and provide accurate data that could be useful for future decision making processes. According to Wortmann (1998), most companies implement ERP systems to entertain the benefits of standardisation, business system integration and improved decision making processes. These systems enable best practice in all business areas, such as initiating business process re-engineering, and they are cheaper to maintain and supported by quality standards [ISO 9000].

A study conducted by Kennerley et al. (2001) identified the benefits and shortcomings of ERP implementation in an organisation. The assessment was based on four distinct levels: corporate, plant, functional and individual. The prime reasons for the installation of an SAP system were to ensure common operations and procedures across the business, standardisation of reporting and to provide an oversight of the business. Most company managers expressed their view that all objectives had been met and that several other benefits were derived from the system. The following summarises the benefits that were identified by Kennerley et al. (2001) from their specific study:

- Improved efficiency and control: There is great reduction in administration and the ability to make decisions has increased. The interaction with suppliers and customers has increased providing better coordination and control.
- Rationalisation of inventories: There is a better control on stock and new a purchasing strategy for capital equipment has been identified.
- Cross border capacity optimisation: Better communication between different business units put an end to traditional means of communication, such as fax and email, and enabled the company to overcome data transcription errors, with the ability to plan ahead and manage capacity across its entire production site and inventory control.
- Increase leverage on suppliers: Better understanding of future material requirements by merging inventory and material usage. The system provided the capability to negotiate larger and longer term contracts providing significant buying power to the company.
- Improved planning: A more complex analysis can be conducted with the help of the SAP system. It enables the management to make investment decisions and perform operational planning. Company profitability can also be increased due to the informed

decisions made by management from improved information. Inventories can be controlled to ensure that raw materials are purchased at a better price. One of the managers referred to this benefit as the “ability to protect the company from upcoming surprises”.

Ragowsky (2008) argued that even though ERP applications could improve efficiency and effectiveness by adding value and automation, integration of business processes and sharing business data along with work practices; some ERP vendors had been boasting about the abilities of their ERP products to gain competitive advantage over their peers. Hence, it is important for companies considering ERP implementations that they undertake a realistic value add analysis before an ERP adoption decision is made. Turban et al. (2006) emphasised the internal and external systems integration associated with introduction of an ERP system. The internal integration allows different functional areas of business to be presented under a ‘single umbrella’ leading to many operational benefits. The external integration benefits promote cross-collaboration and data exchanges between a firm’s allied partners, enhancing significant business-to-business (B2B) information exchanges as well as improving partner relationship management (PRM).

One reason for the success of ERP has been the importance of such systems in integrating the supply chain so as to facilitate information flows across all business areas — in effect allowing a large corporation to be managed in real-time (Turban, 2006). The manner in which ERP has applied industry standards to organisational business processes has also been recognised as a significant success feature (Keller & Teufel, 1998), allowing a corporation to espouse enterprise-wide best practices. The ability of ERP systems to integrate business functions provides significant tangible and intangible benefits (Sandoe, Corbitt and Boykin, 2001). The tangible benefits include reduction in employee numbers and inventory stock; improvements in productivity, order management and timely deliveries – all of which can lead to increased profitability. The intangible benefits are associated with new/improved business processes; information supply chain visibility; process standardisation and enhanced globalisation opportunities.

Keller and Teufel (1998) agreed that the standardisation imposed on business processes was a major benefit of ERP system implementation. Arguably, standardisation may come at the expense of business process flexibility; however, business process standardisation allows industry best practice to be adopted by a business with the commensurate benefits. The level of standardisation resulting from the adoption of best practice standards delivered by ERP

would enable competitive advantage to the adopting firms. For successful implementation, existing business knowledge must be translated into application knowledge. This is done by mapping existing business processes with ERP package embedded processes and defining new processes that should fit with both the new system and organisational needs (Vandaie, 2008).

2.7.2 Barriers to implementing ERP

It is reported that the failure rates of ERP projects have been high and researchers over recent years have been investigating factors that would enable success in ERP implementation and reduce the failure rate. There has been less attention paid on analysing an implementation team's competence and effectiveness subsequently causing issues in relation to implementation management, dealing with ERP adoption and managing change (Hoch & Dulebohn, 2012). Aladwani (2001) identified possible staff resistance to change as one of the critical issues related to ERP implementation. If employees considered ERP application as a threat to their jobs, then they would develop negative perceptions of the system. In Aladwani's (2001) opinion, the literature does not provide enough assistance to reduce or overcome this problem and so resistance to change remains a significant issue.

To overcome the potential resistance from users, company management should communicate effectively with employees. Communication strategies could be used to educate prospective users about the benefits of the ERP system; in many cases ERP projects fail due to lack of communication. Once the senior management realises this problem and addresses it appropriately then outcomes might be different (Al-Mashari et al., 2000).

Aladwani (1998) identified two major sources of resistance that could affect the ERP implementation process. These are perceived risk and the habits of employees. Perceived risk is associated with the decision to adopt an innovation and employee habits refer to routine practice. It is critical to identify the source of resistance before formulating a strategy to overcome the challenge. The lessons learnt (knowledge) from previous implementations could be used as a prime source to point out potential users, and formulating a strategy that would convince staff to possibly adopt the change (Aladwani, 1998).

In a study of a company that had implemented a SAP (ERP) system, Kennerley et al. (2001) found that there was a greater degree of frustration among users who were confused about how to implement and use ERP systems. Many users complained about the lack of training

and insufficient documentation and expressed concerns over the level of support provided by in-house professionals and contractors who facilitated the implementation.

The cost of ERP implementation might also be considered as a major challenge for organisations. Given the complex nature of these systems, cost estimations are often difficult. Rosa et al. (2012) argued that as ERP systems are based on 'off the shelf' software products, their implementation should not be treated in the same way as standard IT applications. ERP implementations focus not just on software or hardware installations but may also change business processes, organisational structure or even culture. Rosa et al. (2012) noted that the vendors have been implementing changes in their products to reduce the complexity in implementation and create more agile systems. However, cost remains a major point of concern.

According to Silva and Fulk (2012), ERP projects often do not meet their targets and fail to achieve desired objectives. Relevant barriers to successful implementation should be identified and appropriate strategies put in place, so that projects are run and delivered successfully. Silva and Fulk (2012) further argued that ERP systems are expected to deliver benefits such as reducing ongoing development costs and providing real-time access to business data. However, implementation often proves problematic and evidence suggests that around 75% of ERP implementations fail to achieve desired objectives (Silva and Fulk, 2012). ERP researchers need to understand the reasons behind these failures and the poor performance in implementing projects.

2.7.3 Requirements of ERP

Klaus et al. (2000) argued that to meet the diverse nature of the market, ERP solutions are presented in a highly configurable form to facilitate customer demands. These forms are: Generic, Pre-configured, and Installed.

The Generic form could be defined as a complete software application that targets a number of industries; it needs to be configured properly before use. Pre-configured ERP applications are customised solutions, developed for specific markets or companies and specifically targeting small and medium businesses. After identifying the requirement of the company the Installed version is operationalised.

Multi-cultural/ regional challenges

According to Rao (2000), it is of great importance for all business units around the globe to be extremely effective across the organisation. Therefore, a challenge for ERP systems is to create information resource integration across an organisation regardless of geographic spread. ERP vendors must develop software that can be used by companies with global operations. Consequently, ERP systems must cater for the regional requirements of these companies, including addressing HR related rules, preconfigured charts of accounts for specific countries and the ability to handle multiple currency transactions (Klaus et al., 2000). As mentioned by Rao (2000), ERP enables companies to control their operations at multiple geographic locations.

ERP systems are proposed to be the symbolically best option to adopt in an organisation because of its dynamic way of organizing business processes and data. This recommendation results in an expensive practice because of the software customisation required to make it more practicable to run. A major problem occurs specifically when there is cultural mismatch, particularly when a company is operating outside of North America or Western European where most of the ERP developers are located (Davison, 2002). There are important lessons to be learned from experiences involved in the implementation of ERP systems worldwide.

2.7.4 ERP adoption

For the purpose of this thesis, ERP adoption means a process by which ERP applications are used to deliver new functional, technical and infrastructure change. Adoption includes the point of an ERP adoption decision being made through to ERP implementation phases until the change is accepted by the business stakeholders.

As already discussed, ERP adoption can involve a diverse range of issues including cost, technological understanding and human resource constraints (Rao, 2000). Edward et al. (2003) developed an ERP system life cycle model based on that created by Esteves and Pastor (1999) for ERP adoption. This comprised of six adoption stages, as follows:

1. **Adoption and decision-making:** Early preliminary stage in which preparatory work could start leading to a suitable ERP application selection decision.
2. **Acquisition:** Meeting relevant requirements to facilitate the implementation process.

3. **Implementation:** Practically implementing an ERP application. This comprises the ERP project start to finish.
4. **Use and maintenance:** Post 'go live' use and ongoing maintenance of the ERP application, providing business support.
5. **Evolution:** Enhancements and evolution of the ERP product in a business.
6. **Retirement:** Retiring the application and replacing with another product.

ERP adoption is a transitional process starting from one functional operability state through to another.

There are many motivational factors that would help organisations adopt an ERP system. These include integration and standardisation capabilities, flexible client server architecture, the ability to drive effective business reengineering, and management of core and support processes (Computer World, 1998). On the other hand, one of the major problems faced by an organisation during ERP adoption is the level of flexibility provided by the system, allowing dynamic reconfiguration to define new business models and processes (Stedman 1999). With minimum effort, companies need to integrate their data processing system with newly acquired business functionalities (Law et al., 2010; Gupta, 2000).

While making the ERP adoption decision, the effects of traditional economic based variables (including cultural, economic and macro environmental factors) and the organisational variables (including internal political, strategic, financial management factors) all need to be considered for effective decision making (Ugrin, 2009). In other words, the internal organisational and external environmental factors should collectively be considered while deciding on the suitability of ERP application. Ugrin (2009) further claimed that in some instances, institutional factors would outweigh the traditional systematic analyses and result in organisational adoption of ERP even when the technology does not fit with the organisation. This reinforces the effects of organisational factors on ERP selection decision and adoption of an application.

Porter (1985) and Aladwani (2001) suggested a low cost strategy for ERP adoption. It was argued that this strategy would help organisations to survive in a competitive market. It is important for organisations to increase the adoptability rate of new applications and encourage end user acceptance by generating the net outcome of adoption processes and communicate the outcome effectively (Amoako, 1999).

Finney (2011) described communication as the necessary component for an effective ERP adoption; especially while considering activities such as change adoption, change management and execution of an effective knowledge transfer strategy. Effective communication should be considered an integral part of ERP adoption from pre-planning through to implementation. Law et al. (2010) stated that, generally, companies tend to remain focused from beginning through to ERP implementation but entirely neglect aspects relating to post-implementation. This could result in compromising the eventual outcome of ERP, even after the ERP project has been successfully delivered (Law et al., 2010). This reiterates earlier argument that ERP adoption is a complex process.

2.7.5 Summary

Business process reengineering as result of ERP implementation enables organisation to standardise and optimise its business processes, improve efficiency, optimise capacity, rationalise inventories, effectively manage supplier-distributor relationships and enable real time, accurate and timely information availability for reporting. Due to the complexities involved with ERP applications, their implementation has been reported as being a tedious process. The capability and competence of the implementation team, the potential resistance to change due to business process optimisation, limited or unsatisfactory training are identified as some major barriers for ERP implementation. The nervousness of staff is generally due to lack of knowledge of the application, fears about job security and inability to perform required functions on the new application. ERP applications are available in a highly configurable format that enables organisations to conveniently implement and maintain them. For multinational companies having business at several geographic locations and with different cultural requirements, ERP systems enable them to manage their business efficiently by providing data integration and real-time information reliability. ERP applications adoption could be considered as a business transformational process starting from an application selection decision, through to test its suitability, application acquisition, implementation, utilisation, maintenance and retirement. While adopting ERP, traditional and economic factors are also considered important including cultural influences and macro environmental factors. Similarly, the organisational factors such as, internal political, strategic and financial management are also important. It is argued that the communication is vital for ERP adoption, to ensure that the relevant stakeholders are engaged with the critical decisions made for acceptance and mitigating the risk of resistance.

2.8 ERP implementation

For the purpose of this thesis, implementation means a step-by-step ERP implementation processes starting from ERP project inception (start-up) through to planning, design, configuration, testing and project delivery ('go live').

Given the evolving nature of ERP systems, there are different opinions about how to approach ERP implementations. One view is to focus on ERP as a product or commodity in terms of software applications (Klaus et al., 2000), with ERP modules as integrators of all business processes and data under one inclusive umbrella. As already discussed, ERP systems are equipped with features that embrace costing, finance, sales, contact management, customer relationship management and human resources issues (Rooney et al., 2000). Arguably, each application area becomes a central focus in order to understand and facilitate the ERP implementation process. It is important to note that getting a desired outcome from ERP applications could be a difficult task due to related constraints involved in its implementation and customisation (Marnewick, 2005). It is therefore advisable to focus on long term business objectives associated with ERP implementation to understand the complex nature of integration processes (Boubekri, 2001). A strategic approach is required to address business needs with respect to the organisational, technical and people (human) aspects of ERP implementation.

Aladwani (2001) identified various organisational, technical and people strategies that would help ensure the successful implementation of ERP. These are:

- Organisational strategies should include proper project management, recognition of organisational structure and business ideology, change strategy development and deployment, appropriate managerial style and available communication mechanisms.
- Technical strategies should address the technology challenges of ERP installation and include gaining a thorough understanding of systems configuration, hardware complexity, the capabilities of technical staff to handle pending challenges and access to sufficient resources (time and cost associated factors).
- People strategies should include the ability to identify and manage staff attitudes towards change, inclusion and involvement of all staff in the implementation process as well as an appropriate ERP training regime.

Using these strategies, Aladwani argued, would reduce the likelihood of project failure (Aladwani, 2001).

The implementation of ERP is a dynamic process due to the ever changing requirements of clients or business stakeholders. To maximise the output or successful outcome from an ERP implementation, it was suggested that an organisation should follow relevant setup processes carefully (Rooney et al., 2000). The core processes would include order acceptance, planning, logistics and order fulfillment; the requirements should be obtained correctly in the 'requirements gathering' phase. The details about application configuration and translation of existing business processes on the new process maps should also be completed. This information will feed into scoping efforts that will eventually reduce the cost and improve standard implementation delivery (Rooney et al., 2000). The requirement and delivery outcomes of every implementation could vary, depending upon the organisation's expectations. The business characteristics of a company define guidelines for ERP systems and the variety of modules in the application that best fit those business characteristics. For instance, ERP application modules could interact with customer orders and with material management (in the case of manufacturing) and also take care of stock levels, suppliers, production and product customisation. In this way, ERP systems would dramatically impact on operational characteristics, but other ERP modules may have different effects on business operations (Gefen et al., 2005). Similarly, Ara and Al-Mudimigh (2011) suggested that ERP implementation could include various management functions, leading to reorganisations in departments at different levels.

Rosa et al. (2012) indicated that the use of effort and schedule estimating software modules could help to design the outcomes of an ERP implementation. The initial set of modules utilise product size to forecast the reengineering effort and the integrations requirements. Rosa et al. (2012) proposed an implementation estimation strategy comprising product size, measured in form of organisational **R**eporting requirements, **I**nterfaces, data **C**onversion and **E**xtension (RICE) for configuration or customisation development. The total integration effort presents the reengineering requirements along with the system engineering, program and change management, development, testing and evaluation, and finally the training and development efforts required for the implementation (Rosa et al., 2012). Hoch and Dulebohn (2012) argued that the number of ERP modules added in an implementation project would increase the complexity tremendously. For instance, implementing all modules of a Human Resource Management System (HRMS) would be a major undertaking, resulting in a highly complex project that might require years to complete.

Hoch and Dulebohn (2012) stressed the need for effective leadership in an ERP project. It was stated that effective leadership would present a suitable approach to improve the functioning of the implementation team. Hoch and Dulebohn (2012) also presented a concept of shared leadership with every team member engaged in leadership behaviour. This approach is contrary to a typical single leader approach and it has not been applied to the ERP implementation teams.

Another approach for ERP implementation was presented by Al-Mashari (2002) who suggested that an intense effort would be required to highlight the business and technological requirements of an organisation before ERP systems could be implemented. Al-Mashari (2000) also stated that a successful ERP implementation would be directly related to organisational preparedness. Success could be defined as a favourable result or satisfactory outcome in accordance with user expectations. The outcomes of ERP projects could be evaluated on the basis of different factors, such as technical, effectiveness and user experience related factors (Wei, 2008). According to Rao (2000), there is a certain level of competence that should be achieved to reflect organisational preparedness when it comes to ERP system adoption — these levels relate to technical, human and management aspects of the organisation.

There are a number of other approaches discussed for ERP system implementation. For example, Wilhelm et al. (2000) stated that a certain traditional information system modelling method could be used to reduce the persistent cost of ongoing ERP implementation. As ERP is generally defined as integrated business software, the modelling required for ERP implementation should detail the aspects relating to all abstraction layers in integration management. The prime objective should be progressing from upper to lower abstraction levels, such as enterprise modelling to final coding, with complete existing business process information (Monnerat, 2008).

ERP has become a strategic survival instrument for businesses using IT to conduct their operations. ERP implementation requires a huge investment and greater initiative towards engaging resources such as time, money and people (Yang, Wu & Tsai, 2007). The use of multi-factor business strategies (as identified) has been suggested as a suitable approach for the adoption or upgrade of an ERP system.

2.8.1 Strategizing and planning for ERP implementation

Rao (2000) explained the importance of prerequisite measures to be taken by an organisation before implementation of ERP system. Al-Mashari (2002) also stated that an intense effort is required to highlight the business and technological requirements of a company before implementation. To achieve the desired level of success, organisational preparedness is essential. There are some important factors to be considered in the preparation of ERP implementation. According to Rao (2000), there is a certain level of competence that should be achieved to embark on organisational preparedness. These levels cover three major aspects, as follows:

Technical aspects

- *Infrastructure Resource Planning:* For pre- and post-implementation stages there should be a planned technical infrastructure that is reliably available in the time of need. The network standards are common for all ERP systems, so it is better if they are in place in advance.
- *Local Area Network:* According to the network trends and requirements of ERP systems, the local area network should be established. All basic and advanced network requirements should be met to support not only ERP systems but other applications as well.
- *Servers:* Servers can only be ordered after selection of an ERP system application. Most organisations take a long time to make a final decision about selection of an ERP system package and it is important to have adequate servers available at the training and modelling phases.
- *PCs:* It is important to have PCs with the latest configuration to meet the technical requirements of ERP systems. (Rao, 2000)

Human aspects

- *Training facilities:* There should be appropriate planning for training facilities. Instead of establishing temporary facilities it is more reasonable to have a permanent setup for training staff.
- *Human Resource Planning:* One of the major factors that makes an ERP system implementation project a success is team work. It is crucial to have right team with the right number of people to work across the organisation.

- *Education about ERP:* It is important for people to understand what the ERP system is and what it can do. ERP education must be carried out across the organisation to make it easy for staff to understand ERP principles and the right attitude required towards ERP systems.
- *Commitment to release the right people:* Adequate planning is required in advance for the people who will be directly involved in the ERP project. Only those people who are committed to work must be engaged. Commitment from the best people in the company can only make the project a success. (Rao, 2000)

Management aspects

- *Top Management Commitment:* Top management must understand and accept the fact that there is a lot of learning involved in an ERP project. There must be an exchange of ideas between people who are implementing and people who have already implemented to get the desired result.
- *Commitment to implement “Vanilla version”:* There should be a policy to implement the ERP system without customisation and a review after six months of implementation. The 80% of benefits could be driven from areas such as, integration, data transparency, where only 20% of the customisation would be required. In this way, 80% of the benefits would be achieved with the high morale of workers resulting in quick and successful completion of the project.
- *Reasonably well working manual systems:* To give a true picture of current status and to take corrective measures, an audit must be carried out along with training to make the current system provide acceptable correspondence.
- *Strategic decisions on centralised vs. decentralised implementation:* If the organisation has more than one operational location, then it is important for management to decide whether each location will have their own servers or there will be a centralised setup. Rao (2000) suggests that it is more reasonable for an organisation to centralise their IT resources.
- *Major reasons for centralization:* The overall cost of centralisation is two to three times lower than a decentralised setup. When there is larger server platform, the cost per user reduces dramatically. The centralised setup provides better control over operations, the manageability and IT expertise required are reduced and data provision from one place makes it more accurate, complete and with provision of all information from source. (Rao, 2000)

A similar conceptual model for ERP implementation was proposed by Marnewick et al. (2005) consisting of '4Ps', addressing the four fundamental aspects of the ERP implementation. It was indicated that there are a number of constraints involved in the process of ERP implementation that could lead to the failure of an ERP project. Marnewick et al.'s (2005) framework reportedly enhanced the understanding and implementation process for ERP systems. The model derived its structure from well-known marketing strategies associated with the '4Ps'. For ERP implementation, the '4Ps' are:

- *People* - the customers that represent organisational requirements/mindset.
- *Product* - software modules that are to be implemented across the business.
- *Process* - representing the project's change management issues.
- *Performance* - analogous to data flows associated with business processes.

Marnewick et al. (2005) stated that it would be difficult to obtain desired outcomes or possible benefits derived from ERP systems due to stakeholder's changing list of requirements. It was further indicated that every aspect in the model has a direct or indirect impact on ERP implementation processes and includes identification of organisational requirements, customisation of selected software, the installation and subsequent operations, and finally the important needs of system training for personnel. All various proposed levels are important for ERP system adoption, allowing organisations to progress through implementation processes that require all relevant factors to be considered (Marnewick et al., 2005).

2.8.2 Selection criteria for ERP implementation

The successful implementation of an ERP system could create competitive advantage for organisations (Law et al., 2010). ERP applications are scalable and multi-functional complex systems that have several modules for implementation (Hoch & Dulebohn, 2012). In principle, ERP applications are applicable to all of industries and can bring many benefits, but they are costly (Tsai et al., 2012). This reaffirms the need for a suitable and closely aligned ERP product implementation in an organisation.

Tsai et al. (2012) evaluated several selection criteria that could directly or indirectly influence the service quality and success of an ERP implementation. It was claimed that enhanced system quality and service quality would increase user satisfaction. Furthermore, it was concluded that a selection criteria that most users consider important for ERP implementation would actually have no influence on the actual ERP system implementation success. For ERP

implementation to be reliable, the organisation should emphasise having new selection criteria for selecting an application. The organisation should focus on criteria that have been shown to facilitate successful implementation of the system. Tsai et al. (2012) developed a conceptual framework to investigate how selection criteria should be linked with system quality and the service provided by external contractors and suppliers. Four selection criteria items were claimed as important by Tsai et al. (2012): consultant's suggestion; in form of independent expert advice, a certified high-stability system test; such as quality centre with robust testing mechanism, compatibility within the systems; an ability to integrate with other corporate applications and business processes provision of best practice.

In light of a review of other research studies on the suitability of selection criteria for ERP systems, Tsai et al. (2012) identified eleven selection criteria items that should be considered for ERP implementation. These are:

- The external consultant's suggestion/advice.
- Flexibility in adjusting demands in accordance with business requirements.
- A comprehensive mechanism for risk management and security control.
- An ability to integrate with several different platforms and data.
- Other ERP applications being used by customers or suppliers.
- Ease of integration with other applications such as CRM or SCM etc.
- A certification of high-stability system.
- Ease of use and maintenance support availability.
- Compatibility with systems and business processes.
- A provision of best practice.
- Time required to implement the application.

Furthermore, Tsai et al. (2012) also developed seven consultant selection criteria, as follows:

- Consultant fee.
- Consultant's project management ability and support.
- The expert domain knowledge of the consultant.
- The past ERP implementation experiences of the consultant.
- The past ERP implementation experiences of the consultant in the same industry.
- The experience of the consultant in ERP implementation approaches and tools.
- Potential 'go live' support provided by the consultant.

2.8.3 Critical success factors for ERP implementation

Aloini et al. (2012) provided a list of critical factors for a successful ERP project implementation. These are: human resource capabilities and their management; cross functional interaction and coordination; ERP application configuration and features; change management; organisational level leadership; system development; and effective project management. Similarly, Ara and Al-Mudimigh (2011) identified eleven critical success factors relevant to the causes of ERP project failures, as follows:

- ERP team composition and teamwork ability.
- Change management and change culture programs.
- Support from top management
- Business vision and plan.
- Business process engineering/reengineering with minimum or no customisations.
- Project monitoring.
- Effective management and performance evaluation.
- Effective communication.
- Software development, testing, and troubleshooting.
- Identification of project champion.
- Appropriate strategy for business and IT legacy systems. (Ara & Al-Mudimigh, 2011)

Ara and Al-Mudimigh (2011) argued that critical factors in the early stages of implementation (pre-implementation stage) should contain ERP implementation planning through utilising the project management lifecycle theory and analysing various stages of implementation. Finney (2011) also stressed a need for effective communication within an ERP project and stated that a communication strategy is recognised as a critical success factor for change management. It was also indicated that there has been little regard for the stakeholder perspective and even less for practical communication planning.

Aloini et al. (2012) was of the view that branded hardware and/or software requirements, the wide range of organisational human resources, and political situations would add another layer of complexity in ERP project management. This would further add to the lack of relevant skills, proven knowledge of the application along with the requirement of project management and risk management skills.

Tsai et al. (2012) applied a series of measurements to update models for ERP project success and evaluate the performance of an implementation. The model contained six information system success factors, as follows:

- *System Quality* – reliability, flexibility, ease of use and response time.
- *Information Quality* – credibility, timeline, usefulness, understand-ability and relevance of the output.
- *Service Quality* – overall support provided by the supplier, users would be customers and poor user support could translate into lost customers and eventual loss in sales.
- *The use of ERP system* – the frequency of the application being used by the company, such as use in decision making, changes to use and connection time etc.
- *User satisfaction* – the success rate of user interactions with the application, covering the entire customer experience lifecycle starting from information retrieval through to purchase, payment and invoicing.
- *Net benefit to the organisation* – positive or negative organisation wide impact of the application.

Law et al. (2010) presented three major issues that should be considered at the very beginning of ERP implementation: the level of customisation requirements; choice between in-house and/or external contracting and / or outsourcing the entire project; managing conflicting interests with key stakeholders. These issues would have a significant impact on project planning, scoping and establishing an acceptable charter at an early stage of an ERP project, therefore these aspects - must be handled tactfully (Law et al., 2010).

2.8.4 ERP project management

According to the Project Management Institute (PMI) (2013), a “*project is a temporary endeavour to create a unique product, service or result*”. The temporary nature of a project specifies that it has a defined start and finish date and every project, whether it has been able to meet its objectives or not, will be terminated. The Project Management Body of Knowledge (PMBOK ®) is a best practice guide for project management, developed and maintained by the PMI in the United States (Ara & Al-Mudimigh, 2011). In the PMBOK guide, there are five process groups identified for project management: initiation, planning, execution, controlling and closing; together with ten key knowledge areas for effective project management (PMI, 2013). These knowledge areas are: project integration management, scope management, time management, cost management, quality management, human resources management,

communications management, risk management, procurement management and project stakeholder management.

Carton et al. (2008) conducted a research study on project management strategies and used the PMBOK guide as a tool, stating that the governance of a project at multi-levels of the organisation is critical for the success of an ERP implementation project. This multiple level governance structure would ensure that the project is managed appropriately, maintaining the key focus and reducing delay or rework for its timely completion. Ara and Al-Mudimigh (2011) argued that for a successful ERP project, it is important to manage associated risks effectively. It was stated that project management is all about the practical application of knowledge, skill, tools and techniques to project activities to meet and deliver required outcomes (Ara & Al-Mudimigh, 2011). Furthermore, it was highlighted that strategic project management at an early stage of implementation should be used. This would enable success by dictating a need for change in the relevant departments and core functions. Understanding and serving the needs of relevant resources within an organisation would also be critical by actively addressing the changing needs of people, process and technology.

Edward et al. (2003) discussed an ERP system life cycle model presented by Esteves and Pastor, (1999) that explains six different stages of ERP systems, includes, Adoption decision, Acquisition, Implementation, Use and maintenance, Evolution and Retirement.

Risk management

ERP applications use common database and standard procedures while sharing the data between functional areas of the system. Yet ERP system implementation is not simply a computer system project but rather an expensive and high risk investment project that would impact on the organisation's primary and support processes, as well as its business process structure and procedures from existing legacy systems. In addition, ERP also impacts on and changes the roles and responsibilities of existing staff and the way they have been performing their duties over the years. Aloini et al. (2012) identified other risks associated with ERP, such as hidden costs and intangible benefits. Furthermore, it was stated that based on research estimates, 90% of the SAP R/3 ERP projects ran late while another study concluded that out of 7,400 IT projects, 34% ran late, 31% were over budget and only 24% were completed on time and on budget. It was suggested that one of the reasons for having so many ERP projects fail is that their managers do not take sensible measures to assess the associated risks and appropriately plan to mitigate those risks. Therefore, it was concluded that to maximise

success in ERP projects, it is important to have associated risks identified and their consequences understood.

Similarly, Ara and Al-Mudimigh (2011) suggested that from the very start of an ERP project, key components such as procurements and deployment through to completion are analysed to assess potential risks. A successful ERP implementation could become the backbone of business intelligence and process efficiency, yet the implementation itself has significant associated risks including technical problems, business process gaps, functionality management, change adoption, training, people/human risks, risk of cost/budget blow out and so forth.

Aloini et al. (2012) further explained that while managing risks within an ERP project, it is important to define 'risk'. For effective project management, it is important to manage all sources of uncertainties clearly and effectively. According to Aloini et al. (2012), quantitative (or qualitative) risk assessment processes can systematically guide risk management activities by collecting and evaluating data on the potential severity of effect and/or consequence to the risk event and probability of its occurrence. In complex projects, risk management could lead to a range of organisational benefits and reduce uncertainties for the project outcomes. These benefits include:

- Enhancing the organisational control over the project.
- Effective resourcing.
- Increased confidence in achieving project milestones.
- Precise estimation.
- Improved project outlook.
- Enhanced ability to take advantage of situations.
- Minimising surprises and unexpected events.
- Improving chances of success.
- Effective planning at the time of disaster.
- Avoiding rework and
- An ability to promote a win-win situation. (Aloini et al., 2012)

Aloini et al. (2012) suggested some established frameworks for effective risk management, including:

- PRM Guide (Professional Risk Manager Guide by PRMIA provides guide for risk management);
- PMBOK Guide (Project Management Body of Knowledge Guide by PMI USA, provides standard for project management);
- RAMP Guide (Risk Analysis and Management for Projects is a strategic framework for managing project risk and their financial implications);
- the Australian Standard and SHAMPU process (Shape, Harness and Manage Project Uncertainty processes for effective risk mitigation); and
- PRINCE2 project management methodology (Projects in Controlled Environments, v2; a project management methodology, a de facto standard by UK government).

According to Hunton et al. (2004), due to some features of ERP systems such as automated work flows and rational databases, there has been a substantial amount of risk involved in setting up ERP in relation to business interruption and process interdependency. Hunton et al. (2004) further argued that if access controls of the system are comparatively weak, then there is higher risk in ERP system security. When there is strong monitoring over authentication, authorisation and password control issues, there is no reason to believe that ERP system security is greater than anything else. Weak security can provide easy passage for unauthorised access to the system and its database, which could result in unauthorised modification or creation of record entries. It was further stated by Hunton et al. (2004) that three key security aspects of ERP environment (network, database and application) could be an appropriate solution for implementation of control. The difference in knowledge between specialist and non-specialist could be one of the many reasons associated with security related weaknesses of the system.

Aloini et al. (2012) stated that performing risk management for an ERP project is an ambitious and tedious task. ERP projects are complex and the associated risks could involve a myriad of technological, managerial, psychological and social aspects. Furthermore, Aloini et al. (2012) stated that interconnected and indirect factors of the project could make risk management more difficult, uncertain and significant than normal projects. Ara and Al-Mudimigh (2011) stated that ERP projects are risky and complex; hence their risk management is difficult to manage. Risks could be mitigated via strong executive sponsorship, effective communication, and thorough engagement with core stakeholders and good project management. Ara and Al-Mudimigh (2011) defined ERP project within four levels: process failure, expectation failure, interaction failure and correspondence failure. All of these critically

relate to project activities and could be managed with effective project management techniques.

Lessons learned – Post-implementation

It is suggested that at the end of a project or after critical stage(s), a realistic lessons learnt exercise would enable an identification of implementation weaknesses and record corrective measures used to overcome them. While evaluating the performance of ERP project delivery (Gefen et al., 2005), it is important to examine the value of ERP at a modular basis instead of as a whole system. The selection and implementation of ERP modules strictly depends upon the business attributes and the expected benefits derived from the module depends upon the specific needs and the characteristics of the organisation. The benefits derived from ERP implementation depend upon the organisational expectations, which may be different from module to module (Gefen et al., 2005).

2.8.5 Section summary

ERP Implementation is a process to practically deliver an application that could serve the business needs. Implementation starts with planning, followed by analysing business requirements, setting up and designing the system, reengineering, installation, configuration and testing of the system before it goes live.

There are strategies proposed for successful implementation of ERP systems, categorised by the organisational, technical and people domain. The change and stakeholder management along with communication are considered important for the organisational strategies. Data conversion, interfacing and reporting are important for technical delivery. Furthermore, the end user experience, training; project team building and competencies are important the people domain. Some researchers identified ERP implementation planning prerequisites comprising of technical, human and management aspect, delivering a detailed list of associated factors. Another researcher related ERP implementation with 4Ps (People, Product, Process, Performance) and argued that the stakeholder expectation management and end user training could be considered as critical factor for success. There were other critical success factors discussed by different researchers including, human resource capabilities, cross functional interaction, coordination and communication, application configuration, effective change management, strong leadership, identification of project champion or sponsor, strategy for legacy system management and an effective project management.

Establishment of selection criteria for ERP application selection is vital. It was argued that due to complexities of ERP applications; the level of change required within an organisation, it would be important to test the suitability of an application and its potential alignment with the existing business process before it is implemented. Some researchers provided parameters to consider while establishing selection criteria for ERP applications.

For an effective project management in ERP, there are documented standard such as, PMBOK guide for management and PRICE2 methodology for governance in each stage of implementation. Effective risk mitigation and management are considered important for the success of a project. Best practice frameworks available within PRINCE2 methodology, PMBOK and other guides including PRM, RAMP could be considered for an effective risk management.

2.9 Chapter summary

In this chapter, a distinction is made to define small, medium and large size businesses based on literature analysis. SMEs are defined differently in the different parts of the world based on their economic, cultural and organisational impediments with which they operate. This research study will focus on business containing 50-250 full time employees with annual turnover of AUS\$1-10 million. Evidence suggests that SMEs are important component of an economy; enabling economic progress at the grass root level. It is concluded that ICT could bring a many benefits to SMEs by delivering the latest technology features and ease of management. However, SMEs face significant challenges that restrict them to use ICT effectively. Some of the major challenges faced by SMEs include lack of resources including shortage of funds, limited time and skills, lack of infrastructure and capabilities to manage ICT, limited knowledge and information about ICT innovations and how they can improve their business performances.

The later part of the chapter discussed ERP and the benefits of ERP applications. It was noted that ERP reforms business operations by business process reengineering and redesign of standard operations. ERP systems have enabled businesses to integrate their resources to create optimised operational control. The main objective of having an ERP application implemented is to obtain and facilitate best practice in business operations. There are a number of ERP solutions available; designed and supported by a range of different vendors. There is an enormous cost involved in implementing an ERP application, especially when customisation is required. ERP applications are built on standardised format commonly known

as 'vanilla versions'. Businesses can customise vanilla applications by adding or deleting features to serve the needs of their operations. It is essential for businesses to underline the scope of the project during the initial phases of the implementation and avoid any unnecessary change. There is a greater risk involved relating to implementation due to high cost, overall commitment and adoption of change. All of these issues could be addressed by having a strong strategic direction and predefined set of objectives for ERP implementation.

Adoption defined as an overarching process that relates to the general acceptance of an application, dealing with people and organisational change issues as well as technology. Implementation is a process of rolling out new technology in a step-wise project management phases. Both terminologies are inter-related and are used in this thesis. The terminologies will alternatively be used based on the content discussed.

The next chapter discusses midsize businesses as a particular category of business and introduces an ERP model for midsize businesses.

Chapter Three

A model for ERP implementation in midsize businesses

3.1 Introduction

This chapter covers the fundamental topic of this research, ERP in midsize businesses. Midsize businesses are discussed with reference to ERP vendors and their similarities with SMEs are discussed. This is followed by a discussion of midsize business from a vendor perspective; the significance of ERP for midsize businesses; and ERP adoption challenges. Assuming the pending shift of ERP adoption to mid-sized business entities over last few years, this chapter proposes an adoption model for implementing ERP systems in that business sector. As discussed in the previous chapter, there are indeed some barriers implementing ERP and issues relating to the use of ERP applications. Consequently, this chapter explores a number of strategies designed to overcome these barriers. For an effective implementation, the suitability of an application is a must; therefore there is a discussion to understand the selection criteria to adopt a suitable solution for midsize business will be discussed. The chapter concludes with a discussion of the limitations in the literature followed by a summary explaining how a framework can bridge the gap between ERP and SMEs to enhance the chances of successful implementation.

3.2 Definition of midsize business

It is evident from the discussion in the previous chapter that definitions of SMEs change depending upon the economies of scale, number of employees and other related factors. Based on the literature analysis, a considerable amount of money has been spent on ERP applications implementation in SMEs (Gefen et al., 2005). It was reported that a business with annual revenue of \$10 million would require at least \$200,000 to implement an ERP application. Similarly, a business with an annual turnover of \$50-\$80 million would need to invest at least \$600K-\$800K to implement an ERP application, depending upon their customisation requirements (Yates, 2004).

The gap of perceptions between defining a small and medium size business widens in the business and technology worlds. Gable (1999) stressed the need to understand the differences between small, medium and large size enterprises and to clarify how such differences would impact an ERP implementation outcome or issues faced by SMEs. Hence, it is valuable to provide a unified definition that would enable a translation of different perceptions into a single framework.

One of the key factors identified from the literature in relation to ERP implementation has been the cost of implementation (Rosa et al., 2012). It was reported by Aberdeen (2006) that the cost of ERP applications has reduced to a point where now these applications have become affordable for SMEs. Arguably, the implementation of ERP in SMEs could be viewed from the perspective of applying the success factors already identified for larger businesses to a different set of smaller entities. However, SMEs are unlike their larger business counterparts (Aberdeen, 2006).

As the understanding of ERP vendors on SMEs is different, the attributes used to define SMEs also varies, based on the geographic location, strength of economy and other related factors. Consequently, there is a need to use a cohesive approach by redefining SMEs for the purpose of this research. The approach should include ERP vendors' perspectives on SMEs along with other influential factors.

As discussed, many researchers use SME as the core terminology in their related research investigations. In contrast, midsize business is another terminology widely used by ERP vendors and ERP researchers while discussing ERP in the mid-market bracket. It is important to clearly define the term *midsize business*. This would also help to develop an understanding of midsize businesses in relation to ERP and how these businesses differ from or are similar to SMEs.

For the purpose of this thesis, the researcher will adopt the following definition for midsize business to facilitate ERP requirements as well as the business influential factors:

A business operating with more than 50 and less than 250 full time equivalent employees with an annual turnover of A\$10-50 million

It is also important to note that the above definition is somewhat similar to EC (1996) definition for SME, stating that a business can only be considered SME if it has less than 250 salaried employees. However, the EC (1996) definition did not specifically include turnover and/or any other parameters necessary to reference a firm based on its geographic location.

Figure 3.1 below provides a collective presentation of small, medium, midsize and large size business definitions as adopted in the research. The definitions of small and medium businesses are illustrated in Chapter 2, section 2.2.3.

Small Business EFT = 1-25	Medium Business EFT = 26-50	Midsize Business EFT = 51 - 250	Large Business EFT = 500 plus
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Figure 3.1: Definitions of businesses according to employee numbers (EFT)

EFT (equivalent full-time) staff of the company

Saccomano (2003) defined the middle market bracket as a company having \$25 million to \$100 million annual revenue. Rosa (1998) stated that companies are following a trend of major shifts from saturated markets to the midsize business market with an average turnover of \$500 million to \$2 billion.

It is important to note that the small, medium and midsize terminologies have been inter-dependently used by researchers (refer to Table 2.1) in the past. In the chapter two section 2.2.1, the definitions of medium size used by many researchers are similar to the term midsize business as defined above for the purpose of this research. These businesses (medium and midsize) co-exist in the same dynamic environment. As such, differences may only relate to the size of operations and the number of employees. While conducting data collection, the researcher ensured that participants understood the definition of midsize and mapped their experiences in accordance with that definition. The midsize business market is distinctive in its own way from small and large enterprises. Generally, these businesses do not face the resource limitations of small enterprises, or the extent of operations like their large counterparts.

3.3 ERP and midsize business

The importance of midsize business is evident from the literature (Coyte et al., 2012; Haddara & Zach, 2011) due to the critical contribution they make to the economy. Midsize businesses play a vital role in job and wealth generation, enhancing economic activity and expediting economic growth (Coyte et al., 2012; Pramukti, 2003; Rovere & Lebre, 1996).

To increase production capabilities, midsize businesses should be vigilant in adopting the latest ICT (Barad & Gien, 2001). This will increase the innovation, productivity and efficiencies within business processes (Correa, 1994). ERP systems have been historically associated with implementation in large businesses. However, there has been a trend in the past few years of midsize businesses considering ERP applications as a strategic alternate to their

existing information systems. Due to the saturation of ERP applications in large enterprises, ERP vendors have gradually changed their focus towards SMEs. Furthermore, globalisation, international partnerships, value networks and extensive information flow across businesses. This has made it crucial for small and midsize companies to pursue business management applications such as ERP systems (Haddara & Zach, 2011).

With their increased attention on midsize companies, ERP vendors have been offering a wide range of specific solutions that were originally designed for large enterprises (Alshawi et al., 2011). Midsize businesses have been taking advantage of these innovative changes, adopting and implementing business management applications. It is important for midsize businesses to utilise their resources and adopt some means of automated data transfer both internally and externally (Caillaud 2001). This can be achieved by adopting a sophisticated ERP application with modules specifically suited to their business needs.

According to Haddara and Zach (2011), ERP systems have received considerable attention from both academic and professional industries over the past years and many publications relate to ERP implementation aspects and/or adoption issues. Furthermore, researchers have paid comparatively little attention to issues relating to ERP implementation in midsize businesses, even though such businesses are considered critical for economic growth in most developed economies (Oke et al., 2007) and within technological intensive industries (Coyte et al., 2012).

In general, ERP research is considered to cover a broad spectrum. Hence, the focus of this thesis will be specific to ERP in the midsize businesses. This research will provide a deeper insight on issues and aspects relating to ERP implementation in midsize business. The literature has reported that midsize businesses are fundamentally different from their large counterparts (Coyte et al., 2012); hence detailed research on the topic would enable better understanding in the area. Researchers such as Schlichter (2010) and Moon (2007) have provided an encapsulated view of the published research on ERP, revealing that the academic knowledge on ERP system has reached a degree of maturity. However, recently the number of publications on ERP has decreased (Schlichter, 2010), yet the area of ERP in midsize business needs further exploring and validation.

According to Saccomano (2003), the initial target market for ERP vendors was large companies that could afford solutions costing millions of dollars at project start up. However, many multinational companies, as a consequence, have had to restrict their operations to working with midsize partner companies that use compatible ERP applications. Hence, it has

become essential for many midsize companies to adjust their business models and adopt ERP software that is compatible with the large enterprises with which they deal (Rao, 2000). Thus, midsize enterprises are increasingly finding themselves attracted to ERP solutions and their associated benefits.

3.3.1 ERP vendors and midsize businesses

In the early 1990s, large organisations were seeking a single system that would enable them to have complete control over every business process, from obtaining raw materials through to sales and distribution. ERP systems provided the perfect solution (Saccomano, 2003). In last two decades, ERP vendors had been focusing on the midsize business market and strategies were applied to expand and offer solutions to midsize businesses. In late 1990s, SAP signed technically skilled and niche market experienced integrators (Rosa, 1998). There were only a few mid-sized businesses that could afford a highly sophisticated ERP solution in the year 2000, whether offered by SAP, Oracle, PeopleSoft or J. D. Edwards, among others (Lee, 2000). But, as already indicated, the focus of ERP vendors shifted from attention on large organisations to midsize businesses. Ahmad et al. (2013) stated that the number of ERP vendors focused on midsize have risen significantly in the last decade.

Gable (1999) conducted a study on ERP implementation issues in small and midsize businesses in Australasia. He identified a number of reasons that could encourage ERP vendors to target mid-market businesses as potential customers:

- Large organisations have already adopted ERP
- The close integration between small-midsize and Large size businesses due to e-commerce
- High level of growth in midsize businesses,
- The majority of businesses all over the world are small and midsize businesses
- Technological advancements are encouraging small and midsize businesses to adopt ERP applications
- Database management systems are available at low cost.

According to Mendu (Vice-President of Comsys Information Technology Services, a SAP America Partner), certain companies even needed an ERP system but they avoided any complex integration (Rosa, 1998). Ted Chamberlin (an analyst with the Gartner Group) argued that small revenues in mid-market companies initially discouraged ERP vendors from targeting

midsize businesses but this view changed as they recognised that this sector of business had become more open to their services (Ferguson et al., 2004). This was also a reflection of the fact that the larger business market had 'dried up' by the year 2000 (Saccomano, 2003). Ferguson et al. (2004) also stated that ERP vendors, such as SAP and PeopleSoft, sought to increase their share in the midsize-market by boosting their offers and developing business specific applications. Vendors also introduced self-service portals with additional features to improve account, billing and invoicing functionalities (Ferguson et al., 2004).

Due to rapid changes in technology, technological advancements and rapid reduction in computer prices, now it is possible for small organisations to buy a cheap ERP solution. In the initial stages of ERP (around 1970-80s), main frame computers were required to run the systems. However, in the early 2000s, client server technologies and scalable RDBMS made ERP systems use easier (Gupta, 2000). In the past decade, rapid changes in technology and the emergence of newer technologies such as services oriented architecture (SOA), cloud computing and high performance computing has transformed the development and delivery of enterprise applications (Zhang et. al., 2014). ERP vendors also offer simplified midsize business solutions at a competitive price (Malhotra et al., 2010). Many vendors, such as SAP and Microsoft, are actively engaging in delivering small and midsize business specific solutions and exploring their growth potential within the mid-market bracket.

In recent times, vendors have been concentrating on customised processes that match ERP application modules with existing processes, thus enabling midsize businesses to adopt the application easily. In addition, ERP vendors are offering extensive post-implementation support services with the help of their reseller partners in relation to business application strategies, implementation integration and optimisation services (Malhotra et al., 2010). By offering a midsize business centric packages strategy, ERP vendors were able to capture their market share, (for instance, on demand business solutions offered by vendors i.e. SAP Business by Design) (Missbach et al., 2013; Yates, 2004; Ferguson et al., 2004). Lee (2000) argued that midsize businesses may not go for vendor sourced branded ERP applications but may consider cheaper alternatives that could serve their business expectations appropriately. In contrast, Haddara and Zach (2011) questioned the feasibility and flexibility of an *in-house open source* ERP product compared with an *off the shelf* vendor-based solution. It was argued that a vendor-based "off the shelf" ERP packages may have rigid business process structures that would be inflexible and would require extensive investment to customise. Consequently, such solutions may not be viable for midsize businesses.

According to Ferguson et al. (2004), PeopleSoft had plans to assign a client manager for every hosting customer. Business application strategy, implementation, integration and optimisation services were achieved with assistance from service partners and outsourcing companies (Ferguson et al., 2004). SAP had been trying to differentiate itself in the midsize market by providing additional functionalities into its *Business One* solution by introducing partner programs. SAP planned to target companies with staff ranging from 5 to 500 by integrating new software and Business One (SAP ERP application for midsize businesses). New functionalities include logistics, advanced warehousing and CRM (Missbach et al., 2013; Ferguson et al., 2004).

In the early years of 2000, Glovia - Fujitsu Ltd, a well-known ERP brand within the Japanese mid-market, offered an ERP application solution for Japanese businesses. The solution targeted service operators and distinct manufacturers. At the same time, another company named Zeesoft (zeesoft.ca), an application service provider (ASP), launched its enterprise application for midsize businesses. Saccomano (2003, pp 46) noted that Paul Hamerman (an analyst with Forrester Research) commented as follows:

The mid-market space is becoming the next battleground and we'll see consolidation of weaker vendors as companies try to gain critical mass. This challenge for the mid-sized companies in the lower half of the mid-market is whether they can digest the complex ERP system or not.

3.3.2 Limitations of midsize businesses

Midsize businesses are vulnerable and exposed to different challenges, primarily due to their size and operability (Sarbutts, 2003). The associated risks to midsize businesses are related to the availability of adequate resources, such as time, money and skills, to run their operations (Barad et al., 2001). The literature suggests that decision making processes for introducing the latest IT applications in midsize businesses could be constrained by a lack of resources, availability of accurate information, lack of skilled labour and management ability to adopt new change (Rovere & Lebre, 1996). Another strategic issue faced by midsize businesses is the continuous need to update their technological systems to meet the demands of existing technology standards (Rauof, 1998). The future growth of midsize businesses depends upon the use of advanced technologies for enhancement of their production capabilities. Use of the latest technology could help develop quality products at a cheaper cost and efficient delivery to customers (Barad et al., 2001).

It is suggested that IT in general creates opportunities for midsize businesses to become competitive in the marketplace (Rovere & Lebre, 1996). However, midsize businesses with limited resources often find it hard to improve IT support services (e.g. increasing the number of trained/experienced IT professionals on staff and/or expanding their IT departments). In the midsize business arena, several internal and external factors could also govern technology adoption behaviour. Kennerley et al. (2001) identified internal factors such as lack of training and insufficient information/documentation about new IT systems as major issues; while external factors were associated with the level of support provided by implementation professionals and the nature of ongoing technology upgrades.

Information integration could be a motivational factor for midsize businesses to consider implementing ERP applications. This would allow them to approach a level of business flexibility similar to large enterprises. There are suggestions that some *smaller* businesses were unaware of the advantages of ERP technology and how the technology has become necessary for global interaction — an issue that, if not addressed, may eventually push small businesses out of the market (BRW, 2002).

Rao (2000) argued that when a business operates on a small scale, the company has time to maintain a customer focus but with an increase in the size and scale of operations, new functions require business operations to be managed. This establishes a layer of complexity in operations that may end up as barriers to core functions. One of the major problems a company may face would be lack of communication or limited information flow from the bottom to the top level. To understand performance factors, company executives need to meet regularly. Another problem could be managers who are not committed to their responsibilities within their department or organisation. For example, a production manager might be in position to make critical decisions about equipment utilisation, but not be concerned about the negative impact on inventory turnover. Similarly, another major hurdle could be the poor quality of information provided, which may result in poor managerial decisions (Rao, 2000). The above arguments illustrate a need for standardised business processes in midsize businesses that could be delivered as a result of ERP implementation.

3.3.3 Contemporary challenges

Barriers to implementing ERP in midsize businesses

There has been a considerable amount of evidence suggesting that companies face problems while implementing ERP applications. Millions of dollars are spent every year in purchasing

and implementing ERP products. In addition, problems relating to customisation can often result in budget blow-outs and extensive delays (Martin, 1998). The nature of problems faced during ERP implementation are quite complex in comparison to the implementation of other IT applications (Parr et al., 2000). Some of the important aspects in relation to ERP implementation are discussed below.

Lee (2000) highlighted that the benefits of ERP software adoption were not realised by small manufacturing concerns. Generally, ERP system users have not been technological experts and the lack of ERP application user-friendliness due to difficult interfaces has been a challenge (Alison, 2002). This poses a significant end-user training issue for resource-constrained midsize businesses.

Aladwani (2001) identified some critical issues in relation to ERP implementation that included possible resistance from staff toward adaptability. To overcome possible resistance to change, management could engage and communicate with its employees in a more effective fashion. In many cases ERP projects fail due to lack of communication (Al-Mashari et al., 2000) and this could be considered as a major barrier for ERP implementation.

According to Alison (2002), the majority of ERP users may not be ICT experts and do not want to be the experts. Product manufacturers had spent time and money to achieve *Enterprise Application Integration (EAI)* to enable an integrated set-up of ERP with external applications. Due to rapid technological developments, ERP vendors had to design software modules with *situation handling capabilities* regardless of the size and nature of the business involved. The Internet has also been playing a critical role in ensuring better interfacing in ERP applications (Alison, 2002).

Gable (1999) identified the following barriers to implementing ERP in midsize businesses:

- Due to limited business cycle of midsize businesses, they lack resources and have less control over business operations. It is possible that such businesses would not be able to influence their vendors, which could lead to lack of proper service.
- The owner/managers of midsize businesses may have greater influence on the strategic and policy issues of the company, consequently the decision making would be in hands of a few individuals who have greater authority in regard to implementation of an ERP solution.
- Managers may be less computer literate and might prefer to continue with their current business information system.

- Due to low level technical backgrounds, it could be possible that midsize businesses might not want to put themselves in any technically sophisticated situation.

From the above discussion, it is understood that the barriers to implementing ERP in midsize businesses could be far greater than those faced by large enterprises.

Strategies to overcome barriers

With the implementation of ERP application(s), organisations are expected to go through significant structural reshuffles affecting people and their work practices. It is therefore important to have a well-defined and appropriately developed methodology for change process management in accordance with the organisational strategic direction. Change management has been identified as a particularly important part of risk management (Al-Shamlan et al., 2011). There has often been resistance to change and there are many different ways available to resolve these issues during ERP implementation. Taylor (1999) discussed nine key solutions for challenges that midsize businesses would face while implementing ERP applications. Some companies take precautionary measures while implementing ERP applications, with successful outcomes. The nine proposed solutions are (Taylor, 1999):

- **Scalable software:** that can meet future requirements.
- **Finding the best way:** to implement solutions with minimum cost involved.
- **Having realistic expectations:** Requirement specifications must be realistic and achievable.
- **Allocation of resources:** The right number of resources must be allocated to achieve the best outcomes.
- **Overcoming fear of change:** Reduce the possible of resistance by providing product knowledge to users.
- **Mapping out key business processes:** Map business processes to a negotiable point where software could be implemented easily.
- **Converting data:** for the new system.
- **The urge to take shortcuts:** Short cuts will not provide an appropriate long-lasting solution; therefore it is important to avoid any short cuts.
- **Training and technical support:** Software training must be provided to ease reliance on technical support.

In an ERP implementation, the project team should concentrate on functional planning in the requirement gathering phase, followed by budgeting processes (Al-Shamlan et al., 2011).

Furthermore, transformational changes are more risky than incremental change processes so this would need to be considered in any change management strategies. Al-Shamlan et al. (2011) argued that there are two major sources of change resistance: perceived risk and habit. Both these risks could be mitigated and effectively managed by effective communication, coordination with relevant stakeholders and by applying tools and techniques as necessary. A constructive dialog with commitment to address the change issues, ownership of change and extensive engagement could be used as a means of addressing change problems. Likewise, internal and external communication such as communicating project scope, aims and objectives, activities and deliverables to relevant staff and providing regular updates on the project could help reduce anxiety and resistance to change (Ara & Al-Mudimigh, 2011).

3.3.4 ERP adoption by midsize businesses

As discussed in the earlier sections, most of the large size enterprise have already had adopted ERP applications to meet with their business' growing needs (Klaus et al., 2000). It was also specified that midsize businesses have found themselves attracted to these applications due to their cost effectiveness and collaborative requirements to do business with larger enterprises (Klaus et al., 2000). Some growth factors for ERP in the midsize-market bracket (midsize businesses) include; continuous industrialisation and its reliance on small and midsize business, adoption of new technologies such as client server and availability of small and midsize business centric ERP applications and so forth (Rao, 2000). Generally, the impression has been that implementing ERP is an expensive process and midsize businesses could not afford them, but this would not mean that midsize businesses do not need ERP applications. Information integration could be one of the major triggering points for midsize businesses to implement ERP applications and achieve high levels of business flexibility with their larger counterparts (Rao, 2000).

In relation to ERP adoption, several types of selection criteria have been developed for midsize businesses that are considering adopting an appropriate ERP solution. These criteria include affordability, supplier knowledge, local support, technical upgradeability and the availability of the latest technology (Rao, 2000). Furthermore, Rao (2000) argued that there is a need for 'micro' ERP systems that contain most of the ERP capabilities but are available at an affordable price. Such systems have been developed for small and midsize businesses over the past few years, including SAP Business One (SAP-B1) and SAP A1 for small and midsize businesses (Missbach et al., 2013)

An important aspect of adopting ERP applications is to understand business requirements and how to customise applications to align with existing business processes or to alter those processes according to ERP application standards. Customisation increases the risk of failure and the cost of the project compared with non-customised implementations (Wilhelm et al., 2000). Higher levels of dissatisfaction amongst ERP application users have been observed due to customisation and business process reengineering (BPR) related issues, impacting mainly on cost and the duration of the project. ERP vendors have also admitted that a customer generally spends more to implement than to buy the software itself (Wilhelm et al., 2000).

There have been several studies conducted that analyse the adoption of ERP applications based on technologies. These studies have suggested that factors that could influence the adoption of ERP applications include the 'size of an organisation' being a major influencing factor affecting the adoption process (Alshawi et al., 2011). Alshawi et al. (2011) also argued that 'organisational size' could be crucial for the adoption of technological and/or administrative, innovative and web-related services in an organisation. In addition, it was argued that along with size, management knowledge and an organisation's attitude could also be considered as dominating factors influencing ERP adoption. Hung et al. (2011) argued that a potential misunderstanding of additional expenditure required for knowledge management after application adoption; provides a unique approach for such components requiring effective organisational knowledge management. Furthermore, it was argued that most midsize businesses suffer due to low profits as a result of tougher market competition (Hung et al. 2011). For example, the global financial crises (GFC) of 2008 had enormous economic repercussions resulting in around 80% of businesses within the mid-market bracket facing significant financial constraints. This meant that many were unable to implement sophisticated applications or introduce innovation in their business processes (Hung et al., 2011).

Factors influencing ERP adoption decisions

While making adoption decisions for ERP applications, organisations generally tend to identify their business and technology needs to establish a business case. Haddara and Zach (2011) conducted a comprehensive literature review on ERP adoption in small and midsize business and argued that the current literature on ERP adoption has several issues in relation to the midsize business context. To understand and evaluate the adoption and ERP selection process, many case studies identified factors that could influence ERP application selection in small and midsize businesses. Organisational factors such as business complexity, change management, external factors (like supply chain partners) and networking pressures could be

considered important for the selection decision (Haddara & Zach, 2011). While other studies suggest that cost drivers, business functional requirements, flexibility and scalability and the degree that ERP can align itself to existing businesses process could also be influential factors for selection decisions.

As outlined in Chapter 2, some researchers have adopted a TOE framework for the purpose of developing a model that could help predict midsize business adoption of ERP applications (Haddara & Zach, 2011). Additionally, adoption of enterprise systems by midsize businesses is generally influenced by internal organisational and technological factors instead of the industry and/or market-related factors. In contrast, with reference to another study, Haddara and Zach (2011) argued that with the higher rate of collaboration amongst midsize organisations, businesses are likely to adopt enterprise applications due to environmental factors.

BRW (2002) conducted a survey that showed that most Australian midsize businesses were unaware of the advantages of technology and were focused more on sales and revenue generation. This was considered to be a major concern for Australian economic development, given such short-sightedness.

Haddara and Zach (2011) provided an insight into potential adoption decisions in India, suggesting that the business needs or requirements along with competition in the market, survival and the desire to retain customers could be a few of the drivers influencing midsize businesses to adoption ERP. Furthermore, a pre-adoption framework was discussed that was developed for the purpose of evaluating the suitability of ERP applications in terms of business requirements, business process complexity, level of change that a company could endure and the cost of ERP implementation. Free open source ERP applications in comparison to vendor delivered branded ERP systems are likely to have less cost dependencies. Business complexity could be considered to be a weak ERP adoption predictor in comparison with business size being strong predictor (Haddara & Zach, 2011). In addition, the willingness of midsize businesses and their readiness for adoption could be affected by their type of industry such as, manufacturing, retail, customer services and so forth. Other evidence suggests that the financial scarcity, resourcing and business size could be other crucial factors potentially influencing ERP selection by midsize businesses (Haddara & Zach, 2011).

3.3.5 Implementing ERP in midsize businesses

ERP implementation phases include business functional requirements analysis, actual installation of an ERP application, business process re-engineering, customisations and other activities that align the application with the organisational requirements (Haddara & Zach, 2011). The implementation process includes critical phases and consumes most of the resources of the ERP project. Project management activities could have greater influence on the success or failures of ERP projects in midsize businesses (Haddara & Zach, 2011). It was further argued that the awareness of senior management, the competence of IT staff, compatibility of ERP and effective project management could be considered as some of the critical factors for ERP implementation in midsize businesses. As already discussed in Chapter two, Alshawi et al. (2011) identified factors that could influence the adoption of ERP applications. For midsize businesses, these factors are identified in three classifications, as follows:

- **Organisational factors**: the factors directly or indirectly relate to the structure of the organisation, operational, human and management requirements. Factors include staff ICT skills, management ICT skills, organisation size, internal barriers, support, funding, strategy, business objectives, customer response/attitude, government regulations, competitive pressure, external barriers and suppliers.
- **Technical factors**: this factor group relates to the *soft* and *hard* aspects of the technologies being adopted, including ICT infrastructure, purchase, implementation and integration cost, system evaluation and selection criteria, complexity, vendor after sale support services and the selection criteria for software.
- **Data quality factors**: this factor group relates directly to the concept of data quality and the way it is handled during the implementation of ERP applications. Factors include the evaluation of data quality, tools and processes, evaluation of the quality of customer data, the customer data infrastructure, and customer data source identification and classification.

The core challenge has not been to replace the manual effort with technically delivery functionality but rather eradicating non-value added work (Small et al., 2011). BPR is identified as a change initiative and is typically supported by ICT systems. The objective of BPR is to deliver superior performance standards through establishing sustainable work practices with the capacity and capability to function effectively (Small et al., 2011).

As also discussed in the previous chapter, Marnewick et al. (2005) suggested an ERP conceptual model comprising four key components. These components are derived from the marketing '4Ps' model and include; People (customer mindset), Product (software application being implemented), Process (change management process as a result of ERP adoption) and finally Performance (revision of the process flow based on ERP implementation change). Change management strategies are also considered critical for ERP implementation and promote steps necessary for the adaptability to change. Hence, it is important to identify factors that influence ERP user acceptance (Bueno & Salmeron, 2008). Similarly, implementation components have either a direct or indirect impact on the ERP adoption processes, starting from identification of organisational requirements to customisation of software, installation to make software operational and training for successful adoption. These levels have significant importance and every organisation has to go through them (Bueno, 2008).

ERP systems require a highly sophisticated infrastructure and there is a great deal of cost involved in it (Gupta, 2000). It would be difficult for midsize businesses to bear the additional burden of implementation and customisation costs in addition to the software cost. However, Wilhelm et al. (2000) explained that there are certain ways to reduce the implementation cost of ERP and increase user acceptance. These ways are (Wilhelm et al., 2000):

- Reduce the effort necessary for creating the target concept by leveraging *best practice case knowledge* available in reference models.
- Create a requirements definition by leveraging modelling techniques to detail the description.
- Document the system requirements definition by means of conceptual modelling methods, making the business logic more understandable.
- Leverage conceptual models as a starting point for maximum automation of system and configuration customising.

According to Haddara and Zach (2011), ERP implementation methodologies could differ based on the size of an organisation and the business process complexities. LEs generally avoid a unified implementation ('big bang') approach but, in contrast, this approach might fit with midsize business needs. A conceptual model was presented by Gable et al. (1999) that could help implementers, vendors and consultants in implementing ERP applications. It provided greater understanding of the system and the expectations of midsize businesses based on the area of their business. Furthermore, Haddara and Zach (2011) argued that the

experience of contractor-consultants could help reduce the unrealistic expectations of the business management during ERP implementation. Iskanius (2009) highlighted a need for effective risk management in ERP implementation in small and midsize businesses and proposed a risk analysis method (RAM). In this method, businesses should assess the associated risks with ERP implementation and relevant methods should be applied for risk mitigation using characteristic analysis method (CAM). This approach could be effective for small and midsize businesses, with a single ERP project divided into several sub-projects or stages of implementation and relevant risks mitigated accordingly.

Haddara and Zach (2011) outlined some other ERP implementation factors. These included, project activities management, coordination with stakeholders, project sponsor identification, clear roles and responsibilities definitions, employee attitudes and behaviour towards the implementation, individual characteristics of the project team and the organisational culture. All of these factors could have a significant effect on successful implementation of ERP systems in small and midsize businesses. The significance of capturing the knowledge and an effective knowledge management strategy during ERP implementation in small and midsize businesses was reiterated by Haddara and Zach (2011). It was stated that essential knowledge required for the ERP implementation should be identified and then matched with ERP capabilities to test the readiness of the organisation.

Selection criteria for ERP in midsize businesses

Businesses must select an appropriate ERP application that best fits their organisational, technical and business functional requirements. In addition, selection of a suitable implementation partner is critical (Haddara & Zach, 2011).

Rao (2000) presented the following specific selection criteria for small and midsize business:

- Affordability: The ERP package should have an attractive price tag including its implementation and support costs.
- Domain knowledge of supplier: It would be important to have the application developed by a company/vendor/firm that knows the industry and domestic requirements thoroughly.
- Local Support: It would be appropriate to have domestic support available for the application and once implementation is complete. A domestic supplier should be available with relevant expertise and domain knowledge.

- Technically upgradeable: It would be important to have upgrades available for the product to accommodate the ongoing technological advancements and added functional features. The ability to upgrade an application helps the customer to trust the flexibility of the product to meet future technological and functional demands. An agreement must be made between the customer and the supplier to have ongoing support available for upgrades at an annual cost.
- Use the latest technology: It would be desirable for a company to choose a product that is easy to implement, is user friendly and amenable to future modification. It is highly recommended that the product should be designed on object oriented technology and with a GUI.

Based on ICT management and business expectations, selection of an appropriate ERP application for small and midsize businesses could be difficult (Wilhelm et al., 2000). ERP affordability could increase by reducing the cost of implementation and increasing the user acceptance experience. Certain modelling approaches could be used to reduce the cost of implementation, such as:

- Use a reference model to select best practice case for implementation.
- Modelling techniques to be used while documenting requirement definition details.
- To make the business logic more understandable, the system requirements should be documented with the help of conceptual modelling methods (Wilhelm et al., 2000).

A conceptual model should be used as starting point for system automation, configuration and customisation (if required).

3.3.6 Literature gap – ERP in midsize businesses

Below are some gaps in the literature identified by Haddara and Zach (2011):

- The ICT literature as well as ERP literature confuses the term “adoption”, perceived differently by researchers in accordance with their own interpretation. Some researchers envisaged it as the final stage of end user acceptance, and some defined it as the preliminary stage starting from project pre-planning.
- The current literature lacks focus on new technologies and the implication of this on ERP projects. Literature lacks a comparison between SME specific and general ERP

system implementation as well as the industry specific ERP packages and general ERP open source solutions.

- Research articles examining ERP implementation discuss critical success factors but *success* is not clearly defined. It is important to note that success could have several different meanings based upon the relationship of an individual or a group associated with the project activities.
- It is noted that the differences in ERP implementation project methodologies and their impact on an organisation has not been investigated thoroughly.
- Even though comparisons between LEs and SME are found in the literature, discussion on what a small, midsize and large has not been discussed appropriately. It is important to note that the size classification for SMEs could vary, depending upon their geographical locations.
- Researchers have opted for a single-sided perspective for their data collection (such as from the customer side). By capturing a broader perspective, the understanding of the topic could be effectively enhanced and enriched.

3.4 Section summary

For the purpose of this thesis, a business containing 51-250 full time employees and maximum annual turnover of AU\$50 million will be considered as midsize and will be focus of discussion. Midsize businesses are unique and they could be defined differently from researcher based on the researcher's interpretation, geographic location or associated factors. In chapter 2, section 2.2.1 and 2.2.2 clearly articulates the perspectives of other researchers from across the world attempting to define SME. Regardless the categorisation, it is indeed evident that midsize businesses have a lot in common with, as well as distinctions from, their larger counterparts.

ERP has changed the way of doing business by re-engineering and redesigning business processes in accordance with standardised business operations. The literature highlights the main objective of having an ERP application implemented is to obtain and facilitate best practice in business operations. Midsize businesses play a vital role toward collective productivity of a nation. Similar to the SMEs, midsize businesses often lack leadership, strategic vision, and they mainly focus on day to day operations. Implementing ERP in midsize business can also be a cumbersome process as they lack accurate and timely information, and have limited resources. Typically, midsize businesses have been careful while selecting ERP applications, due higher risks associated with their implementation.

3.5 Models for ERP Implementation

There is a considerable amount of research that proposes critical success factors (CSF) and process models for ERP implementation. Both approaches are focused on significant planning requirements to ensure controlled implementation (Parr et al., 2000). Bancroft (1996), Ross (1998), Markus and Tanis (2000) and Parr et al. (2000) have all proposed models of ERP implementation to obtain deeper understanding of the implementation processes. These can be used as a basis for development of ERP adoption in midsize businesses in Australia.

Some researchers have categorised ERP implementation into stages and tried to standardise the processes for successful implementation. The following provides an outline of these models.

3.5.1 Bancroft model

Bancroft et al. (1998) developed a model as result of a comprehensive study carried out on ERP implementation in three multinational companies and with consultations with 20 ERP practitioners. Their model consists of five phases: four pre-implementation phases ('focus', 'as is', 'to be', 'construction and testing'); and one actual implementation phase ('go live'). This model covers all major ERP implementation activities and is briefly described below:

- The *planning (focus) phase* consists of initial project activities, such as formation of steering committee, project team selection, project guide development and project plan creation.
- The *analysis (as is) phase* consists of business process analysis, initial ERP system installation, business process mapping on ERP functions, project team training etc.
- The *design (to be) phase* includes high level and detailed designing for user acceptance, and interactive prototyping with constant communication with ERP users.
- The *construction (construction and testing) phase* consists of comprehensive configuration development, population of real data in test instance, interfaces building and testing, creation and testing of reports, system and user testing.
- The *actual implementation phase (go live)* includes network building, installation of desktops and organising the user training and support.

3.5.2 Ross model

Ross (1998) presented another model after analysing ERP implementations through 15 case study large organisations. This model comprises of five phases: design, implementation, stabilisation, continuous improvement and transformation.

- The *design phase* (which could be rephrased as *planning*) includes critical guidelines and decisions made towards ERP implementation.
- The *implementation phase* includes several phases of Bancroft et al.'s (1998) model such as; 'as is', 'to be', 'construction and testing' and actual implementation ('go live').
- The *stabilisation phase* comes after cut-over (final sign off) and if problems identified are fixed, consequently improves the organisational performance.
- The *continuous improvement phase* includes any functionality added to the system.
- Finally, the *transformation phase* covers achievement of maximum system flexibility up to organisational boundaries (a system's operability on every organisational level).

3.5.3 ERP life-cycle model

Esteves (1999) presented an ERP life-cycle model comprising six phases and four dimensions. The phases presented by Esteves (1999) include: adoption decision, acquisition, implementation, use and maintenance, evolution, and retirement. Dimensions represent the different point of views through which each phase should be analysed. These are: product, process, people and change management. The phases of the ERP life-cycle model in more detail are:

- *Adoption decision phase* consists of the definition of system requirements, the goals and benefits and analysis of the impact of adoption at a business and organisational level.
- *Acquisition phase* consists of product selection in accordance with business requirements, identification of customisation requirements, and selection of an implementation partner. Factors to consider in this stage include product and implementation cost, training and maintenance services, and contractual agreements.
- *Implementation phase* comprises acquiring the ERP application package, with or without customisations. In this phase, external contractors became involved to implement and provide know-how/knowledge of the application and training.

- *Use and maintenance phase* comprises of using the product and gaining benefits with minimal disruption. In this phase, aspects to consider include functionality, usability and adequacy to the business process after system implementation. System maintenance and fixing in case of malfunction and general system improvement/upgrade are included in this phase.
- *Evolution phase* includes integration of capabilities in the new system, materialising new benefits and expanding new frontiers for external partner collaboration.
- *Retirement phase* corresponds with the stage when managers decide if they will substitute the ERP software with other information system approaches that are better suited to organisational needs.

In addition to the phases of the ERP life-cycle, the four dimensions are described as follows:

- *Product*: refers to aspects relating to the ERP product such as its functionality, technical features, hardware, software needs, etc.
- *Process*: refers to the pre-existing core capabilities and functionalities of an organisation that need to be supported by the ERP system. There should be a consideration of business process re-engineering, conversion of existing processes to new business process or functional requirements of the ERP application for optimal performance.
- *People*: refers to human resources, their skills, roles and capabilities within the organisation. Roles or skills are required to minimise the impact of ERP implementation, to manage its complexities and facilitate organisational change. This includes contingencies, change in practice and adopting new structures along with learning a new culture in organisation.
- *Change management*: refers to the body of knowledge used to address complex change brought about by ERP implementation. Change management ensures acceptance and readiness of a new system for its optimal use in the organisation.

3.5.4 Markus and Tanis process model

Markus and Tanis' (2000) process theory concentrates on sequences of activities that lead to successful implementation of ERP systems. Markus and Tanis (2000) specified four major phases in the implementation life cycle: chartering, project, shakedown, and onwards and upwards. These are described as follows:

- The *chartering phase* starts before Bancroft et al.'s (1998) focus and Ross' (1998) design phases, beginning with Esteves (1999) acquisition phase. It comprises decisions that lead to financial approval of an ERP project and includes development of a business case, package selection, identification of the project team, budget and schedule approval and so on.
- The *project phase* is similar to Ross' implementation phase and covers all of Bancroft's model phases except focus ('as is', 'to be', 'construction and testing' and 'actual implementation' phases). In this phase, system configuration and rollout occurs and major activities such as software configuration, system integration, testing, data conversion, and training take place.
- The *shakedown phase* refers to the period when the system is beginning to operate normally by removing all glitches and implementing standards.
- The *onwards and upwards phase* is a combination of Ross' (1998) continuous improvement and stabilisation phases. This phase refers to continuing maintenance, user support, upgrade or enhancements required by the ERP system and focuses on any further system extensions.

Markus and Tanis (2000) relate these implementation stages to key activities and key players to highlight the degree of coordination required and also to analyse the factors that affect successful implementation of an ERP system. According to Nah et al. (2001), the phases of the ERP life cycle model presented by Markus and Tanis (2000) are in line with the stages of traditional system development life cycles.

3.5.5 Parr et al's project phase model

Parr et al.'s (2000) project phase model (PPM) synthesises previous models (including Bancroft et al., 1998; Ross, 1998; and Markus and Tanis, 2000) and includes planning and post-implementation stages. The focus of this model is on project implementation and the factors that influence a successful implementation at each phase. Parr et al. (2000) indicated that for an organisation it is important to have a significant amount of knowledge regarding unsuccessful projects and an experienced *champion* should be appointed with well-defined responsibilities. One large project should be partitioned into several sub-projects creating a 'vanilla' implementation. The PPM model consists of three major phases: planning, project and enhancement, described as follows:

- The *planning phase* comprises selecting an ERP application, formation of a steering committee, project scope determination and a broad implementation approach, selection of a project team and determination of resources.
- The *project phase* includes a range of activities from identification of ERP modules to installation and cut-over. As the prime focus of this model is on implementation, this phase has been divided into five sub-phases as follows (note that the last four sub-phases are similar to the phases described in the Bancroft model):
 - *Setup* comprises project team selection and structuring with a suitable mix of technical and business expertise. The team(s) integration and reporting processes are established and guiding principles are developed or re-affirmed.
 - *Re-engineering* comprises analysis of current business processes and to determination of the level of process engineering required. This phase also includes installation of the ERP application, mapping of business processes on ERP functions and training of project teams.
 - The *design sub-phase* includes high level designing with additional details for user acceptance. It also includes interactive prototyping through constant communication with users.
 - The *configuration and testing sub-phase* includes development of comprehensive configuration, real data population in test instance, building and testing interfaces, writing and testing reports and system and user testing.
 - The *installation sub-phase* includes building networks, installation of desktops and managing user training and support.
- The *enhancement phase* comprises stages of system repair, extension and transformation and it may extend over a number of years. This phase encapsulates Ross' (1998) continuous improvement and stabilisation phases and Markus et al.'s (2000) onwards and upwards phases.

3.5.6 Summary

ERP implementation has been described as unique and different from other software implementations due to its strategic impact over business. There are number of attempts made to produce an effective model, providing an appropriate strategic direction for large enterprises while implementing sophisticated business applications.

Based on existing research, the sequence of events outlined as stages are presented below in Figure 3.2:

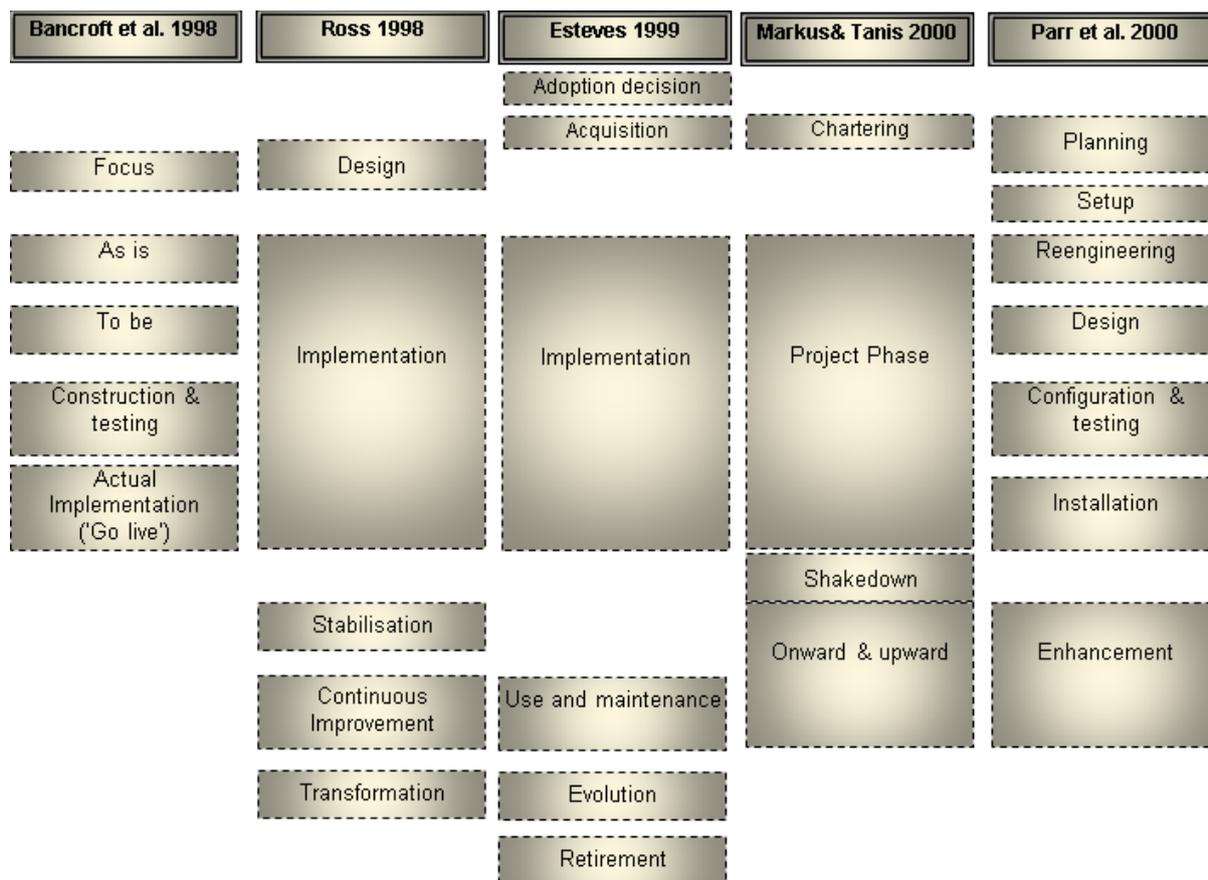


Figure 3.2: Sequence of events outlined as stages

ERP implementation is different from any other application project implementation due to its significant business process change and reengineering requirements. There are a number of attempts made by researchers to produce an effective framework enabling businesses to strategically implement ERP. For instance, the focus of Bancroft (1998) model was mainly on project activities, such as how to make an ERP implementation project a success. Similarly, Ross (1998) analysed number of businesses to test and validate Bancroft's approach along with post implementation factors. Esteves' (1999) ERP lifecycle model started early from the pre-planning stage (adoption decision) and then planning (acquisition) through to implementation and has gone one step further from Ross (1998) by including evolution and retirement phases. Markus and Tanis (2000) process theory provides a strategy focus onto activities that lead to successful ERP implementation. Finally, Parr et al's (2000) model used a collaborative approach by including previous methodologies to develop the Project Phased model (PPM).

Most of the work carried out previously focused on large size businesses, apart from Parr's PPM that was developed considering SMEs. There has been a need to utilise existing

knowledge to develop a strategic model for midsize businesses and the model should address strategic issues faced by these businesses, providing guidelines that could help minimise associated risks for ERP implementation.

3.6 Solutions and Recommendations

The major focus of this research is to develop an ERP adoption model for midsize businesses by critically evaluating the strategic factors and issues with respect to different stages of implementation. Given the various resource limitations associated with midsize businesses and the potential challenges of ERP systems adoption, this study is important in focusing on the specific business sector (midsize) as a basis for proposing a model. The resultant model will contribute to an increased understanding of implementation processes, factors, strategies and issues in relation to midsize businesses, enabling them to determine appropriate solutions in accordance with their operational needs.

As already discussed, the adoption of technology by midsize businesses tends to be influenced by a number of associated factors. These factors could be summarised as a lack of experience in adopting new technology and its implementation, access to decision making information and the availability of general resources (i.e. skill, time and money). Midsize businesses also face a number of other challenges during ERP implementation such as the selection of an effective IT solution, the cost of implementation and customisation, staff training, business process standardisation and post-production application maintenance (Barad et al., 2001; Rao, 2000; Gable, 1999; Rovere et al., 1996). Thus, the midsize business environment (with its limitations) is an important governing aspect of research that is associated with ERP adoption and needs to be part of a conceptual working model.

Different research approaches have also been used to examine and identify factors that are critical for successful implementation of ERP applications. For example, the ERP implementation models discussed in the previous section identify factors associated with ERP implementation stages and the degree of importance of each factor. The traditional system approach (Edward et al., 2003) and marketing derived '4Ps' model (Marnewick & Labuschagne, 2005) also identify factors that are important when considering ERP implementation. Arguably these methods are reliant on resource intense activities that are necessary in larger and change resistant organisations. Another approach of ERP research is to focus on business strategies that allow an understanding of ERP implementation as a business progresses from one implementation stage to another (Aladwani, 2001). The three core strategies (organisational, technical and people) could be crucial for an organisation to adopt ERP application. These strategies are also tangibly identifiable within the midsize business environment and less problematical to investigate than if the study was to focus purely on business processes. It cannot be assumed that midsize businesses can use the

existing ERP implementation frameworks that have traditionally been used by LEs (Rao, 2000).

Clearly, there is a difference between issues that need to be considered while examining ERP adoption in midsize businesses and their large business counterparts (Coyte et al., 2012; Aberdeen, 2006). It is important to adopt a collaborative approach based upon existing research to provide a 'road map', providing a strategic approach across organisational, technical and people domains that recognises the resource limitations of midsize businesses. This forms a strong base for the proposed ERP adoption model described in the following section.

3.6.1 The proposed model

A need to investigate ERP implementation issues in relation to their applicability in midsize business is apparent. In the past, much of the ERP research was described as 'factor research' which focused mainly on identifying *factors or variables* critical to ERP implementation. Later research focused on *processes* that help understand 'how' an implementation takes place (Aladwani, 2001). To take advantage of both perspectives, it is important to focus on an integrated approach to have a better understanding about issues relating to ERP implementation. The link between factors and stages is crucial to analyse the importance of different factors with the change in each stage during ERP implementation (Markus et al., 2000). This will help to assess what factors are affecting which process during certain periods of time and what impact is seen on the process itself. Parr et al.'s (2000) PPM and Markus and Tanis' (2000) process theory are useful tools to conduct the factor impact analysis while developing an ERP adoption model for midsize businesses.

It is also important to establish a link between factors and stages because the degree of importance of different factors changes with each stage in ERP implementation process (Markus et al. 2000). This theoretical base will enable ERP implementers to judge which factor is affecting the process on a certain time during practical implementation of an ERP system. The process theory by Markus et al. (2000) can be beneficial to link different factors effecting implementation with stages of ERP. Therefore, a ***staged adoption model*** is developed to address midsize business issues by critically evaluating the strategic issues related to it.

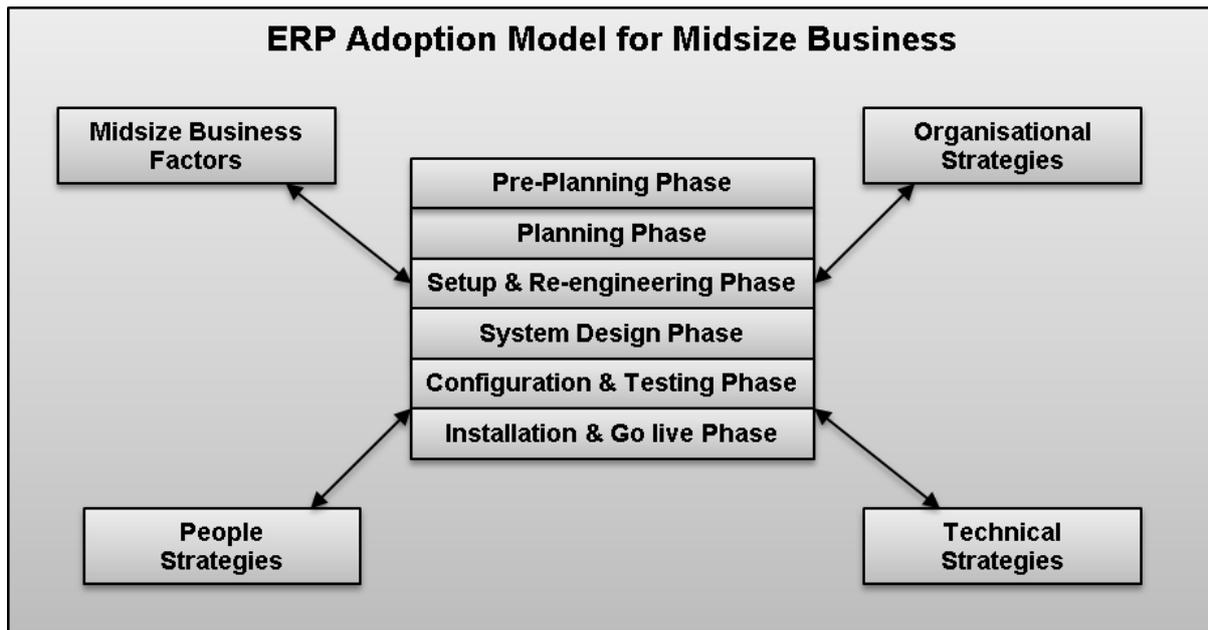


Figure 3.3: ERP Adoption model for midsize businesses

Figure 3.3 above provides a ‘bird’s eye’ view of the complex relationship that exists between the project implementation phases and strategies (organisational, people, technical) with issues relating to midsize businesses.

This model is developed by identifying the ERP implementation stages defined in Parr et al.’s (2000) Project Phase model (PPM) (also presented by Bancroft et al. (1998), Ross (1998), and Markus and Tanis (2000) ERP implementation models) and the three major strategies impacting on ERP implementation: organisational, technical and people strategies, as identified by Aldwani (2001). The model also includes the midsize business specific issues identification and their management to mitigate any risks (Barad et al., 2001; Rao, 2000; Gable, 1999; Rovere et al., 1996). Thus this model adopts an integrated approach of identifying factors critical to ERP implementation along with the processes crucial to every stage of ERP implementation.

Table 3.1 provides a detailed view of the factors associated to ERP implementation stages and relevant strategies in the implementation process. The table is designed to identify key factors associated with ERP implementation processes. The intent is to adopt a best practice theoretical base approach by encapsulating existing literature to propose a strategic ERP adoption model specifically designed to facilitate the needs of midsize businesses. There is an enormous amount of research that has been conducted in relation to ERP implementation in large enterprises; that is used to help identify many of the ERP implementation issues faced

by midsize businesses. However, factors are also introduced that relate specifically to midsize businesses because they are different from large size businesses. Midsize businesses are more fragile strategically, economically and in relation to their operability.

Table 3.1: ERP adoption models for midsize businesses

Stages	Activities	Factors			
		Organisational Aladwani (2001)	People Aladwani (2001)	Technical Aladwani (2001)	Midsize business Barad et al. (2001), Rao (2000) Gable (1999), Rovere (1996)
Pre-planning	<ul style="list-style-type: none"> •Business case development/ project charter •Decisions leading to financial approval •Identification of key stakeholders •Formation of steering committee 	<ul style="list-style-type: none"> * Change strategies development; * Risk management 	<ul style="list-style-type: none"> * Communication strategies 		<ul style="list-style-type: none"> * Business & technology issues * Strategic management issues;
Planning	<ul style="list-style-type: none"> * ERP application selection * Project scope determination * Project team selection * Resource determination 	<ul style="list-style-type: none"> * Change strategies development * Project management * Risk Management 	<ul style="list-style-type: none"> * Training strategies * Change management 	<ul style="list-style-type: none"> * Time & cost of implementation 	<ul style="list-style-type: none"> * Criteria of selecting an IS * Accurate information * Limited resources (time, budget)
Setup and re-engineer	<ul style="list-style-type: none"> * Team structure & integration * Guiding principles * Business process analysis * Installation of ERP app * BP mapping * Team training 	<ul style="list-style-type: none"> * Organisational resources * Organisational structure * Managerial style * Organisational ideology 	<ul style="list-style-type: none"> * Staff attitude to change * Management attitude 	<ul style="list-style-type: none"> * ERP complexity * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Limited resources (budget, skill)
System design	<ul style="list-style-type: none"> * High level designing * Additional details for user acceptance * Interactive prototyping * User communication 	<ul style="list-style-type: none"> * Organisational resources * Communication * Coordination * Risk monitoring 	<ul style="list-style-type: none"> * Staff engagement 	<ul style="list-style-type: none"> * ERP complexity * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Business & technology Issues;
Configuration and testing	<ul style="list-style-type: none"> * Comprehensive configuration * Real-time data in test instance * Build test interfaces * Write & test reports * System & user testing 	<ul style="list-style-type: none"> * Information system function * Communication * Coordination 	<ul style="list-style-type: none"> * Staff involvement 	<ul style="list-style-type: none"> * ERP installation aspects * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Limited resources (budget, skill)
Installation and 'go live'	<ul style="list-style-type: none"> * Building network * Desktop installation * User training * System Support 	<ul style="list-style-type: none"> * Change strategies (update) * Risk management (update) 	<ul style="list-style-type: none"> * Staff attitude to change (update) * Management attitude (update) 	<ul style="list-style-type: none"> * ERP implementation issues (update) 	<ul style="list-style-type: none"> * Business & technology issues (update) * Strategic management issues (update);

The proposed composition of the model and the importance of the related strategies are now discussed.

3.6.2 The ERP adoption model

The model is divided into two major dimensions: ERP implementation stages; and factors impacting implementation. These are represented as a matrix in Table 3.1. The objective is to underline the interrelationship between these two modules and to suggest activities, strategies and tasks to execute the project efficiently. Midsize businesses often lack leadership and strategic vision and they mainly focus on day to day operations. Midsize businesses also tend to be influenced by number of factors while selecting an information system and are often limited by their lack of knowledge and skill. The proposed model will provide midsize businesses with a broader picture of issues that they might encounter during the ERP implementation processes and it will assist them in controlling the implementation.

ERP implementation stages

As shown earlier, different researchers have identified planning, set up, engineering, system design, configuration, testing and installation as separate stages. These have been consolidated to align with midsize implementation requirements. Markus et al. (2000) identified 'chartering' as a crucial stage that contains decision making processes leading up to selection of an ERP application. This has been reflected as a pre-planning phase in the model to highlight the need for activities that are important for decision making processes leading up to selection of a suitable ERP application. The model phases are:

1. **Pre-planning:** It is important for midsize businesses to perform comprehensive pre-planning analysis of their existing financial and operational performance indicators. At the organisational level, strategic planning for projects becomes vital when risks are high and resources are limited. All important decisions leading to financial approval, the development of a business case, gathering appropriate business, technical and architectural information should be obtained and shared with the appropriate people to allow for an informed decision. Midsize businesses should assess the operational significance and collective business benefits of the proposed application before making any judgements. Change management and risk management plans should be developed to underline areas that should be considered during implementation.
2. **Planning:** This is the first official stage of the project in which initial project activities should be performed, such as the identification of key stakeholders and formation of a

governing body and project team selection (including hiring new staff). Change and risk management strategies should be revisited and updated if necessary. A project management plan should be developed to scope the project activities. Project tasks should be scheduled and resources should be identified and allocated (including time and money). Accurate and timely information is very important for midsize businesses to execute project plans in accordance with their desired expectations. Therefore, it is important that information should be accurate during the entire planning process.

3. **Setup and re-engineering:** To execute the project effectively, it is important to structure the project team with the correct mix of technical and business professionals. As midsize businesses lack resources, it is crucial for them to decide whether they need to hire or acquire the necessary skills. Midsize businesses should identify and reassess their available resources (in-house expertise and finances) to structure the project team according to the standard required for ERP implementation. The cost of implementation could be significantly higher if there is a need of customisation in the application. Therefore, the organisation's ideology should be examined to assess staff and management's attitude to change before making any decisions. The guiding principles of the project should be identified and a business case analysis should be completed to underline the expectations. The ERP application should be installed in the development environment and business process mapping should take place with gap analysis. Internal team training should occur to equip existing organisational staff with the appropriate skill levels. For midsize businesses it would usually be wise to have the right mix of in-house and third party technical expertise to avoid any surprises in the post 'go live' phase.
4. **System design:** This is an important stage in which higher level design should be completed and approved. Extensive communication and coordination is required to address organisational expectations and users should be engaged consistently during the development process. Details in relation to user acceptance should be captured and documented. Staff and management attitudes to change should be examined and the change management plan should be updated to cater for resistance to change. ERP applications are complex in nature. Therefore, associated risks should be analysed and addressed by developing a suitable risk mitigation plan. An initial application interactive prototype should be completed to demonstrate application functionality. This functionality should also be compared with midsize business expectations to ensure that it is addressing the business and technology needs.
5. **Configuration and testing:** Once the interactive prototype is completed, its comprehensive configuration should be executed in accordance with the requirements

identified in the design document. Real data should be populated in test instances for system testing, test interfaces should be developed and reports should be documented and tested accordingly. During the entire testing process, staff should be engaged and extensive communication should be conducted at the organisational level. Information system functions should be assessed and prospective change should be coordinated. The project budgetary estimates should be assessed and existing staff skill levels should be reassessed. System and user testing should be completed in this stage.

6. **Installation & 'go live'**: In this stage, all post-testing activities should be executed, such as building the production environment, building the network (if required) and desktop installation (if required). User training should be completed and the system should 'go live' in the production environment. The lessons learned from the implementation should be documented, including change and risk management strategies, management of staff attitudes to change, ERP implementation, business technology issues and so forth. The system support should be ongoing to perform post production *glitch* analysis.

Certain research approaches have been used to examine and identify factors or variables that are critical for successful implementation of an ERP system in large enterprise such as ERP implementation models presented by Bancroft *et al.* (1998), Ross (1998), Markus and Tanis (2000) and Parr *et al.*'s (2000) project phase model (PPM) that identifies success factors associated with the business process stages of ERP implementation. Markus and Tanis (2000) suggested these success factors are variable and have different degrees of importance depending on the stage of ERP implementation. The traditional systems approach (Edward *et al.*, 2003) and the marketing-derived 4Ps approach (Marnewick *et al.*, 2005) to ERP implementation have been proposed as appropriate to use in order to successfully adopt a new system. Arguably, these methods are reliant on resource intense activities that are necessary in larger and change resistant organizations. Another approach to ERP research is to focus on business strategies that allow an understanding of ERP implementation as a business progresses from one implementation stage into another (Aladwani, 2001). Aladwani (2001) further proposed that the strategies for successfully implementing an ERP system in a business can be categorized across organizational, technical and people domains. Indeed, these three strategies are tangibly identifiable within the midsize business environment and less problematical to investigate if the study were to focus purely on business processes. Hence, Aladwani's (2001) identified ERP strategies are an important consideration in shaping and directing the factors that form part of the ERP component in the adoption model.

Clearly, there is a difference between issues that need to be considered when examining ERP adoption by midsize business and their larger counterparts (Poddar 2010). Thus, the model synthesis process is directed by the resources constraints of the midsize business sector and the need for midsize businesses to adopt ERP systems, not only to be more competitive, but also due to applied pressures associated with larger business partners (Rao 2000). The strategies approach across organisational, technical and people domains (Aladwani, 2001) and the resource limitation of the midsize business environment forms the basis of the proposed ERP adoption model. These factors are depicted in Table 3.1.

3.7 Chapter summary

This chapter discussed midsize businesses and their relevance to the ERP sector. The term *midsize business* was defined for the purpose of this thesis.

To provide a simplified approach for midsize businesses' convenience and reasoning to adopt ERP applications, it is important to develop a strategic model that should address fundamental questions relating to ERP adoption decisions and ERP implementation. This model should be able to provide a road map for a cost effective, productive and controlled ERP implementation in midsize businesses, providing a step wise approach on stages of implementation while discussing key factors associated to each stage.

A conceptual model for the ERP adoption in midsize businesses was established in this chapter. The objective was to encapsulate key factors relating to ERP implementation in midsize businesses and present them in ERP implementation stages, to provide a strategic direction for its testing with midsize businesses. The proposed model not only emphasises aspects of ERP implementation but also provides guidance for the strategic aspects of having an ERP application implemented appropriately. This model was presented to a number of experts for their analysis and tested as part of an expert panel (discussion reported in Chapter 5) and the revised model was then refined via a six case study of six organisations (further discussion in Chapter 6 and Chapter 7).

Chapter Four

Research methodology

4.1 Introduction

This chapter outlines the research methodology, design and setting of the study. The chapter also provides an insight into the research methods applied during the data collection and the tools and techniques used for data evaluation. There were two phases of data collection used for the study. The first phase involved an online expert panel consisting of a broad range of domestic and international academic and professional ERP and SME experts. This was followed by a comprehensive case study analysis comprising seven interviews: two interviews with representatives from a large size business, two representatives from an SME implementer specialised in implementation of ERP in SMEs, three midsize businesses and one small size business. Both data collection phases were used to improve and refine the proposed model content and its presentation. Both phases of the data collection are discussed in detail in this chapter.

4.2 The problem and its context

Before exploring research methods, design and setup, it is important to understand the objectives of this study in detail. The objective of this study was to analyse factors relating to ERP adoption and implementation in midsize businesses and propose a strategic ERP adoption model to assist midsize businesses to implement ERP applications successfully. It is evident from the literature that defining success could depend upon the expectation of stakeholders, therefore, for the purpose of this research, a satisfactory outcome would mean enabling midsize businesses to implement ERP within the allocated budget, time and resources in addition to achieving anticipated functionality in terms of expected benefits. The research questions for this study are;

- Q1: What are the factors that influence ERP adoption in midsize businesses?
- Q2. What are the stages of ERP adoption that are relevant to midsize businesses?
- Q3: In what stages of ERP implementation are these factors relevant?

A model for midsize businesses has been developed based on the literature analysis, with refinements made following the data collection phases.

Generally, the focus of ERP implementation research has been on large size businesses and factors associated with ERP implementation success. There is no similar comprehensive analysis in the context of small and midsize business neither has the research delivered a

conceptual framework that could practically be tested and used by midsize businesses. This research has built on the existing literature on ERP implementation for large enterprises, performed an analysis for the identification of key factors relating to midsize businesses and then tested those findings to present a model for ERP adoption in midsize business. It is understood from the literature that small and midsize businesses face challenges that could hinder the ERP implementation processes. As discussed in the previous chapter, some of the key issues that midsize businesses face include lack of ICT infrastructure, lack of knowledge and skills required to implement ERP, lack of knowledge about relevant/ suitable applications, lack of decision making, and limited financial and human capital.

4.3 Research approaches & theoretical perspectives

In this study, an attempt is made to generalise (in the form of the model) from specific inputs received from the data collected. The research relies on an overall documented knowledge about ERP and its implementation while understanding its relevance to midsize businesses. As already indicated, the proposed model is based on literature analysis and was tested using an international expert panel and a comprehensive case study analysis.

4.3.1 Interpretive approach

Generally, an interpretive approach is associated with qualitative research (Williamson et al., 2002). Researchers normally start with an assumption and attempt to investigate or understand a problem via a social construct, such as language and/or the shared meanings people associate with the subject (King and Horrocks, 2010).

Researchers conducting interpretive research mostly rely on natural settings in the area of interest and assume that there are differences between the social and natural worlds as the social world is constructed by people. This means that people develop their perspectives and interpretations of issues and consistently change their opinions (McNabb, 2012; Williamson et al., 2002). Furthermore, researchers initiate their study by gaining detailed insights on the topic from the literature and building strong theoretical foundations. The foundations for research include the theory, research questions and establishing a data collection plan. It is possible that the research might change or alter the research questions and/or the data collection mechanism if unexpected, contrary views are raised about the topic. The researchers might not test hypotheses but develop working propositions that would be based on the research participants' opinions (Williamson et al., 2002).

4.3.2 Positivism and post-positivism

Two other commonly used research perspectives are now discussed: positivism and post-positivism.

Positivist research is generally associated with quantitative data collection methods, such as surveys (Williamson et al., 2002). The post-positivist paradigm also involves qualitative research, such as interviews and focus groups (Denzin et al., 1994). Kuhn (1970) defined positivism as a certain set of interrelated assumptions in the social arena that provide a conceptual and philosophical framework. This is designed to create a systematic understanding of a study. It is generally understood that positivist research delivers results that could be measured or replicated. However, Silverman (1997) was of the view that the purpose of positivist research was not to produce scientific laws, but rather cumulative generalised understandings derived from tedious data analysis. Positivist research could also be associated with deductive reasoning that could further relate to a hypothesis testing approach. In this approach, a researcher could first establish a theoretical foundation and/or a model with defined variables to test. The researcher could forecast relationships by framing the hypothesis and testing them (Weideman, 2013; Williamson et al., 2002).

In the post-positivist approach, the researcher assumes that reality exists but that it is difficult to discover as it is affected by intellect or the fundamentally intractable nature of humans (Denzin et al., 1994). It can be argued that the post-positivist approach shares some similarities with the interpretative approach with the difference that post-positivists believe in a reality that could be measured.

4.3.3 Statement of purpose

The interpretive approach is used as a guide for this study and the researcher does not claim an absolute certainty of findings. The researcher is prepared for the reader to assess and/or judge the applicability of research finding based on the research method used. However, the researcher believes that the outcome or findings and conclusion of this study are relevant to many midsize businesses in Australia.

4.4 Research methods

There are several different methods that could be used to inform research, including grounded theory, action research, conversational analysis, life history, case study research analysis and so forth (Myers, 2002; Neuman, 2006). According to Leedy et al. (1997), “*Methodology is merely an operational framework within which the data are placed so that their meaning may be seen more clearly*”.

The research method applied to this study primarily focused on a modified Delphi method for the first data collection phase (the expert panel), followed by case study research analysis for the second phase. These are discussed in more detail below.

4.4.1 Phase one: A modified delphi approach

Some researchers argue whether to classify the Delphi approach as a data collection technique or a research method (Williamson, 2002a). Some researchers questioned it to be both an art of science (Linstone, 1975) and defined the Delphi method as a blend of communication processes that would allow participants to deliver their thoughts and views while analysing a complex problem (Sheridan, 1975). In another view, the Delphi technique is seen as a platform to obtain comparability and discover opinion and consensus regarding topics in a discussion (Baretta, 1996; Green, 1999). It is designed to prompt discussion for the purpose of obtaining individual responses, while enabling experts to refine their views as the discussion progresses (Adler, 1996). This approach also provides an opportunity to gain better understanding of the issues and argue more effectively (Watson, 2008). Generally, participants in a discussion have a deep interest in the topic, bringing valuable knowledge and/or experience to that discussion (Delbecq, 1975). Delphi approach involves a series of ‘rounds’ of data collection. The model or concept being tested is revised at the end of the each round. Rounds are conducted until there is agreement or differences cannot be resolved (Williamson, 2002a). This study was a modified Delphi as it did not involve continual rounds.

Typically, there are two processes in the Delphi approach. The first is known as the *conventional method*. This is moderated by an individual who designs the questionnaire and forwards it to a large group of experts participating in the discussion. The feedback is then analysed and another questionnaire is developed based on the feedback received. The second type of Delphi process is known as the *real-time* Delphi method. In this technique the moderator is replaced by a computerised program and participants in the discussion

communicate through the internet, responding to an online questionnaire. In this method, a real-time communication system is used to eliminate any delay in summarising results. It is also important to have a robust selection for the expert panel and the approach for an active and continuing participation in the discussion (Watson, 2008).

In addition to the Delphi approach, according to Daneshkhah (2004), *expert judgement* is another method that can be used in qualitative research. This can be an informed assessment based on an expert's knowledge and experience relating to the quantity or quality of content in discussion. Judgement could be considered as a process of gathering and establishing opinions about a research topic under investigation. There could be several criteria used to select experts for a research study. Including their experience, research and publications in the area of research, positions and awards received (Daneshkhah, 2004). It was further explained by Daneshkhah (2004) that expert judgement is applied when data is limited and difficult to obtain because of higher costs, unknown models or data open for interpretation and feedback. These data problems are brought to the expert's attention for discussion.

For the purpose of this study, in the first data collection stage, aspects of the Delphi approach were applied. An online expert panel was established, moderated by the researcher. The researcher developed a list of questions based on the proposed model findings from the literature and posted them online for expert feedback. Based on the above definition of Delphi approach by Watson (2008), components of the real-time Delphi method were applied to establish a non-real-time online expert panel.

4.4.2 Phase two: Case study research analysis

The case study method was employed for data collection in the second stage of this study. For the purpose of this research, case study refers to a specific form of investigation that requires an in-depth analysis of a program, activity or a process (Stake, 1995). Similarly, Yin (2003) defined case study as an empirical study that investigates a contemporary phenomenon in a real-life context, where the boundaries between the phenomenon and context are unclear.

For an effective and comparative data analysis, a total of six cases were selected and seven interviews were performed. The case study organisations included three midsize businesses, one small business, one large size business and one ERP implementer with expertise in SME-ERP implementation. The revised model from the first data collection stage (expert panel) was presented to the interviewees for discussion and they commented based on their practical

experience. According to Yin (2003), the case study analysis provides an enriched insight into data. It brings an understanding of inadequately understood phenomena in a real-world setting with the assistance of transferability of research findings. The researcher analyses a particular case at each time restricted by the activity process or a social group under investigation. This allows the researcher to obtain detailed insights via a diverse range of data collection procedures (Leedy, 1997). The collected data from an in-depth case analysis provides confidence in the findings, especially in the case study research (Miles, 1994).

Each organisation that was interviewed, whether large, small or midsize, can be considered a case, covering a broad range of perspectives on ERP adoption and the factors associated with the implementation experience. There are several data collection methods used for case study analysis, such as those identified by Yin (1984) which include: documentation (written materials, publications, newspaper clippings); achieved records (organisational charts, financial records); interviews (formal or informal, open-ended or focused); direct observations (obtaining details, actions, environment; and examination of physical artefacts (devices, output tools). For the purpose of this study, the researcher used data collection methods including: written implementation documents and formal interviews.

4.4.3 Scope of the Study

Based on the literature review, it was understood that the primarily focus of ERP implementation research has been on large size businesses, while factors associated to small-midsize have not been tested thoroughly. The scope of this study is to identify and analyse midsize business factors by applying an interpretive approach. The data collection comprised of two stages of analysis, while the unit of analysis was midsize businesses as defined for the purpose of this study. In the first phase (the expert panel) a modified Delphi approach was applied. An online expert panel was setup to discuss and obtain expert opinion on the factors identified within the proposed model for ERP adoption. This included the stages of ERP implementation and understanding the relevance of ERP factors to midsize businesses implementing ERP. The participating experts were from a variety of relevant fields consisting of ERP implementation experts, project managers, ERP academics, ERP researchers and professionals with functional or technical knowledge and small-midsize business experts. The second stage of data collection comprised of case study analysis. In this stage, a revised proposed ERP adoption model was tested with a range of different size organisations, to obtain a broader perspective. The interviews were conducted with a large size and a small size business along with three midsize businesses and one ERP implementer specialising in

midsize ERP implementation. This enabled the researcher to test the revised model from the perspective of different organisational experience with ERP adoption and narrowed down the findings beneficial to midsize businesses. Figure 4.1 provides an overview of the research construct, presenting the theoretical and practical contributions of this research study along with the stages of the research.

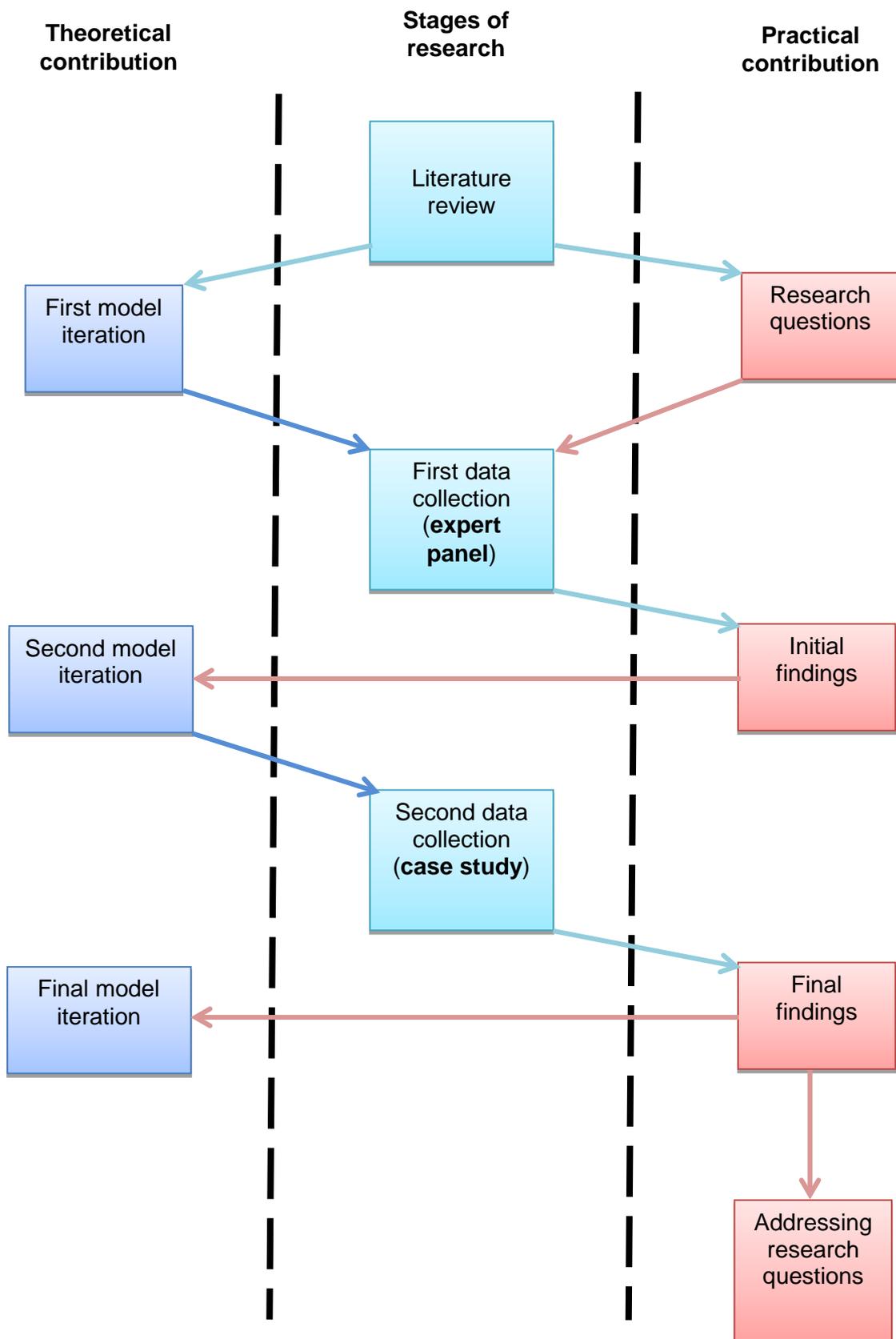


Figure 4.1: Graphical representation of research method

4.5 Data collection techniques

In the qualitative data collection and analysis framework, there are a number of techniques that can be used. From the list only two techniques were employed relevant to the nature of this research study. The first data collection technique used was expert panel and the second was the case study interviews. The next section provides an insight on the data collection techniques used in this research.

4.5.1 Qualitative versus quantitative research

Qualitative and quantitative research techniques are employed by researcher as they relate to their field of interest. Myers (2013) provided an explanation of the differences between qualitative and quantitative research methods as follows:

- Quantitative research was developed for the natural sciences to study natural phenomena. It includes research methods such as surveys, laboratory experiments, formal methods (econometrics), mathematical modelling and so forth. Quantitative research relies heavily on numbers or numeric calculations.
- In contrast, the qualitative research method was developed in the social sciences to help researchers investigate social and cultural phenomena. Qualitative research includes action research, case study research and grounded theory. The data sources for qualitative research include observations, interviews, questionnaires, documents, participant's perceptions (fieldwork) and the researcher's impression and/or reactions.

The qualitative research approach

In this research, qualitative research techniques were applied. Qualitative research approaches help researchers understand people, social and cultural experiences. According to Myers (2013), qualitative data provides a record of what people have said to the researcher, helping them understand motivations or actions in accordance with their experiences. Myers (2013) further added that qualitative research is an optimal choice should the study be about an in-depth analysis of one or more organisations. This technique is good for exploratory research when the topic is new and there is limited published research on the topic. It is also good for social, cultural and political research analyses of people and organisations.

According to Cleary (2014), qualitative research is conducted to collect information driven generally from observations and interviews. It is conducted in a realistic setting with an interpretive nature. Qualitative analysis is used to answer questions about natural phenomena for the purpose of describing and comprehending the phenomena from the point of view of participants (Leedy et al., 1997). In other words, qualitative research focuses more on the social world rather than the world of nature. The social world is related to human beings and relies on the subjectivity of experiences (Liamputtong, 2000). From Malhotra's (1999) perspective, the qualitative research approach seeks better and clearer understanding of the issues under investigation. From a broader perspective, qualitative research could be defined as:

An approach that allows the researcher to examine people's experiences in detail, by using a specific set of research methods such as in-depth interviews, focus group discussion, observation, content analysis, visual methods, and life histories or biographies (Hennink, 2011, pp. 8-9)

Cleary (2014) further alluded that before initiating qualitative research, it is fundamentally important to complete a detailed analytical and critical literature review. This ensures that the researcher has an optimal understanding of the latest knowledge and perspectives in the area/field of interest. It also enables the researcher to clarify research questions, potentially shift the focus, help to extend the findings and clarify perspectives.

Silverman (2013) listed several key points to remember about qualitative research, as follows:

- Qualitative research involves a variety of different approaches.
- A single common thread could attempt to make routine features of everyday life problems.
- Some qualitative research could be criticised for being insufficient but the same could be said for some quantitative research.
- Always make a pragmatic choice between research methodologies in accordance with the research problem and the proposed model.
- Qualitative research should apply rigorous, critical standards.

It is argued that a disadvantage of qualitative research is that large population input cannot be generalised and the data remains focused on a specific group of participants. In other words, a researcher could generalise from qualitative research but is unable to use sampling logic for generalising purposes. For instance, if a research study is carried out on three case study

organisations, the data sample size of the three cases would remain valid for those three and cannot be considered in statistical terms (Myers, 2013). For the purpose of this research, the researcher adopted a qualitative research approach to orchestrate an in-depth analysis of ERP implementation factors with reference to their adoption in midsize businesses. An ERP adoption model based on a comprehensive literature analysis was developed and later tested with a variety of ERP and SME experts in the expert panel (Phase one) and a revised version was later tested in case study analysis. As a result, a final revised version of the model has been completed for the fulfilment of this PhD, encapsulating the perspectives on how to effectively implement ERP in midsize businesses.

The reason for employing two qualitative data collection techniques – the expert panel and the case study analysis - was to thoroughly test the proposed ERP adoption model. Other qualitative data collection techniques, were not used as they were not appropriate for this study. One of the benefits of interviews, according to Williamson (2002c), is that they allow the researcher to control the direction of discussion, enabling the use of quotes specific to the situation and ensuring that the interviewees remain focused on the topic in hand.

4.5.2 Phase one: The expert panel

In the first phase of data collection, an online expert panel was established with experts from a wide variety of backgrounds associated with the topic of research. The discussion was conducted online to enable flexibility for the participants, given the experts for discussion were selected from various locations around the world. It would have been impossible to have all experts in one location at the same time; consequently, the online expert panel provided an opportunity for an open interaction amongst experts, at their convenience, and discussion on every aspect of the model.

An online bulletin board was developed using a free online *blog* hosting website. The participants were contacted informally first to obtain their consent to participate. Experts who agreed to participate in the discussion were later formally inducted to establish the expert panel. The expert panel discussion ran over a five-week period, with a specific aspect of the topic covered each week. The comments and feedback received from experts were analysed and used to revise the conceptual model developed from the literature review. A consolidated view of the discussion was established and the improved iteration of the model clearly reflected the enhancements based on the expert panel discussion.

Focus groups

In qualitative research, focus groups are often used, particularly in IT research (along with other research methods). According to Mann (2000), a focus group is a group discussion in a relaxed environment with the objective of obtaining opinion about a clearly defined area. Generally, a focus group has five to ten participants with planned discussion to obtain feedback from all participants. In other words, Mann argued, a focus group is all about interviewing a group of selected individuals, addressing the same topic and providing opinion based-on their own understanding (Mann, 2000). In contrast, Liamputtong (2009a) argued that a focus group is not about a group interview; it is simply a group of people gathered together to engage in a collective discussion. Liamputtong (2009a) provided the following insights on the advantages of focus groups:

- They are a quick, low cost and efficient way to gather detailed information from range of participants.
- They provide an opportunity to gain knowledge on sensitive topics.
- The researcher has the ability to clarify responses in focus groups and follow-up questions, observing body language to help interpret responses.
- The open discussion enables the gathering of large amounts of data discussed in participants' own words, as well as the sharing of their experiences. Participants often engage in free and open discussion and overcome their shyness.
- The discussion remains focussed and precise data is collected, as the researcher controls the discussion.

Williamson (2002b) and Gibbs (2000) provided some *disadvantages* of focus group, including:

- There is a fair chance that discussion may be dominated by some participants and others may not feel comfortable about sharing their opinions.
- They may run at a low cost, be manageable and efficient yet the data collected only represents the opinions of participants, not necessarily those of the broader population or community.
- A potential bias is that focus groups are driven by the researcher's interests rather than on participants' interests.
- A trained moderator is needed to run the focus group. Without the experience of a moderator, participants may not feel encouraged to openly share their opinions.

Conducting focus groups online

The Internet is a valuable tool and has been used increasingly by academics for their research studies (O'Connor, 2003). It is a beneficial tool for qualitative data collection techniques such as focus groups, expert panels, interviews, as well as for Delphi techniques (Williamson, 2002a). According to Mann (2000), there are two types of online focus groups: real-time focus groups and non-real-time focus groups. In the real-time focus group, all participants are online at the same time. This is a highly interactive and fast medium for communicating and sharing information 'live'. Non-real-time focus groups are conducted asynchronously, with participants not necessarily online at the same time or at the time of discussion. In this scenario, feedback is provided within a certain timeframe as advised by the moderator.

For the purpose of this study, a non-real-time focus group approach was applied in the form of an online expert panel. The strategy was adopted based on evidence from other researchers who had successfully used this method. Molla (2005), for example, conducted a pilot expert panel online to assess the relevance of e-commerce related factors and adoption. Similarly, Karanasios (2008) conducted a study to develop e-commerce framework for small tourism enterprise using an online expert panel for data collection. In this study experts around the world provided insights based on their practical and research experiences, which helped to inform the content of the research model.

4.5.3 Phase two: Case study interviews

In the second stage of the study a case study was conducted. Interviews are widely used by researchers in qualitative research (Barbour, 2008; Bryman, 2008). Liamputtong (2009b) viewed interviews as one-on-one or face-to-face interactions between participants and researcher, providing the interviewee's insights on range of relevant topics. In this research study, the case study comprised seven in-depth one-to-one interviews in six companies, ranging from large, midsize and small businesses that experienced ERP implementation and adoption challenges. According to Holstein (2003), the interview approach is an empirical data collection process in which an individual is encouraged to provide views on certain aspects in detail. Williamson (2002) listed some advantages of the interview approach in qualitative research:

- Interviews enable researchers to gather in-depth insights on issues.
- Interviews enable researchers to gather direct responses from participants.
- Interviews enable open communication and exchange of information.

- One-to-one interviews have better response rates than indirect communications (e.g. via mail or email).
- Questionnaires in interviews evolve due to one-to-one contact with interviewees.
- The interviewer can control the discussion and keep interviewees focussed on the issues being discussed.
- Unstructured interviews can be more flexible and expand on important aspects as various issues are discussed.

Some interview *disadvantages* were highlighted by Malhotra (1999), as follows:

- The limited skills and capabilities of the interviewer can be an issue.
- Lack of structure could make the outcome vulnerable to the interviewer's influence on interviewees. This could result in quality being compromised.

Types of interviews

There are three types of interviews that could be considered for qualitative data analysis (Williamson, 2002c). These are:

- **Structured interviews** are standardised and/or scheduled before their inception. All interviewees are asked the same questions in exactly the same pattern or sequence. There may be some freedom provided to interviewees while they express their opinions, thoughts or views unrelated to the strict agenda followed by the researcher.
- **Unstructured interviews** are non-standardised, unscheduled and in-depth interactions with interviewees. The interviewer follows the flow of discussion and every interview answer could result in a new question. This type of interview is to gain new insights from interviewees and is appropriate for case studies to collective extensive data from key individuals. This type of interview is acceptable for interpretive research.
- **Semi-structured interviews** are based on a standard list of questions but the interviewer could follow the lead of interviewees or ask them additional questions to seek more detailed responses. This type of interview is closer to the unstructured approach than the structured one.

For the purpose of this research study, semi-structured interviews were used for the case study data collection. A list of questions was composed. However, due to the enormity of data sought, the interviewer remained open to discussion and allowed participants to share details as they considered them necessary or relevant.

Conducting a pilot

For the purpose of this research analysis, before conducting interviews, the researcher conducted a pilot interview with the first case organisation. The organisation was the only large size business case interviewed for this study and after completing the pilot, to validate its findings and obtain a detailed view on the organisational data, a second interview was organised with another official. The pilot interview helped with both practical and methodological purposes and assisted the researcher in gaining detailed insight into the case organisation. It also helped the researcher to understand the operational details of the case organisation and to refine the interview structure and case study protocols (Perry, 1998).

The pilot case interview was a convenience selection as the researcher was working within that organisation. At the time of interview, the interviewee (a colleague of the researcher) played a vital role as the Technical Resource Manager of ERP applications implementation at the organisation. Primarily due to the professional relationship the researcher had with the interviewee, the pilot case interview was productive and the researcher was able to explore a range of aspects relating to the organisation's ERP implementation experiences. In addition, the interviewee offered access to relevant organisation documentation, as deemed necessary for the research analysis. It was understood by the interviewee that the researcher was in the early stages of establishing the instrument for interviews and was testing the model. Due to the sheer volume of data being analysed, the researcher tested the time limits and ensured that the interview was completed within an hour. The pilot interview was conducted using a semi-structured approach and the pattern of interviewing as well as the instrument remained consistent throughout the rest of the interviews.

The pilot case interview was conducted in August 2011. The interview was recorded and transcribed. In addition, the researcher made notes about the theme from data and issues relating to research design and procedures (Yin, 2003). The researcher notes were later scanned and kept in an electronic file along with the interview audio recording. The data collected from the pilot was included in the data collection and analysed with other case study interviews.

Conducting interviews

For the purpose of this study, interviews were conducted at several different locations based on the participants' availability and convenience. It is understood from the literature that the location of an interview could have influence on the data being collected and the context of

the interview, as this is considered to be a social interaction amongst two individuals (Neuman, 2005). Furthermore, it was suggested by Neuman (2005) that the interview should be conducted at a private or quiet location, such as a home. In this study, most of the interviews were conducted at the participants' office meeting rooms, based on the availability of each participant. In two instances, interviews were conducted in a cafeteria in Melbourne, as suggested by participants due to their tight schedules.

According to Cavana (2001), there might be some non-verbal behaviour issues that could impact on an interview. Some strategies and guidelines were suggested to counteract such behaviour, such as:

- The interview pattern: clear patterns of interview interactions are required, by having good communication with interviewees through managing language barriers (if any) and encouraging participants to freely provide their insights and in-depth information.
- Listening: the feedback provided by participants in response to questions should be carefully comprehended, clearly interpreting the essence of the comments made.
- Paraphrasing: the interviewer must precisely paraphrase the true message communicated by the interviewee.
- Probing: relevant questions should be asked to *dig deeper* and produce more in-depth insight on the relevant information.

All interviews were carefully planned, organised and scheduled before their inception. A list of individuals who were relevant to the area of interest was made and each individual was informally contacted and invited to participate in the study. As a result, some individuals declined and some agreed to participate. Every potential participant was requested to provide a date, time and venue for their liking to schedule an interview session. The consent information that outlined the purpose of this study and a statement that their participation would remain confidential was provided to each participant. The researcher was aware of the deficiencies of the interview process such as bias, interviewer characteristics and the effects of interviewer on the discussion. To cater for these challenges, the researcher maintained impartiality, remained focused on the topic content and professional throughout the interview process. No cost reimbursement was claimed from the researcher's University; as all interviews were conducted in Victoria, Australia and the researcher bore the costs of data collection.

Interview questions

The interview questions were developed within two categories or phases. In the first phase, standard organisational questions were asked to obtain an insight on business operations and to categorise the case study organisation as small, midsize or large. Initial questions asked were about the size, geographic location, business type/nature, the type and kind of ERP applications implemented, the time and cost spent on each implementation (if multiple), whether the implementation was internally controlled or outsourced, and the implementation methodology used.

In the second category, questions were asked about the ERP adoption model content, factors, stages of implementation, and the relevance of each factor within each stage. Interviewees were asked to comment on the sequence of activities in each stage of the implementation and relevant factors as previously identified from the research literature and the expert panel. The second interview stage was executed as semi-structured, with questions asked in a sequence relating to the model while allowing the interviewee to provide feedback as they deemed necessary. In some instances, interview questions were paraphrased differently to cater for the different characteristics, knowledge and background of the interviewees (Manaster, 1972).

Recording interviews

During the interview process, it is difficult for a researcher to capture all details correctly; hence recording the interview could be advantageous. It is possible that the researcher may forget all critical details of the interview should they decide not to record it appropriately (Flick, 2009).

It is an ethical responsibility of the researcher to seek authorisation or approval from the participant before recording of the conversation could start. Should a participant refuse to be recorded and/or not be comfortable with the recording, this would be a challenge for the researcher and threaten to disrupt conversation (King, 2010).

For the purpose of this research, the audio recording feature of the researcher's Blackberry mobile was used to record conversations. In addition, the researcher took extensive written notes while conducting the interview and maintained a balanced approach to ensure that the interview followed a sequence and was not disrupted. At the start of each interview, participants were provided with a hardcopy of the questions along with the proposed model. The interviewees were asked to provide feedback on the factors and were encouraged to add, delete or move factors from a stage if they thought it necessary. The researcher immediately

noted any changes on a hardcopy. The participants also assisted the researcher to write notes and provide clarification as deemed necessary.

The hardcopies used by the researcher to record interview findings were later scanned and remained as the electronic evidence for later analysis.

Ethics approval

As this research required interaction with people and the handling of data obtained from the public domain, the researcher obtained the appropriate ethics approval from the University's ethics committee. The application was submitted to the University's Human Research Ethics Committee in early 2007 and the approval was granted in April 2007. A further application was submitted with amendments in 2010, due to changes in the data collection process to include the case study interviews. The ethics approval for the second application was granted in 2010.

4.6 Analysing the data

According to Hennink et al. (2011), qualitative data analysis requires an effective interpretation of data using several different strategies. These are explored below.

4.6.1 Content analysis of the data

For the purpose of developing a framework or model for the study, content analysis could be considered as a useful method to test pre-existing findings or analyse data (Ezzy 2002). The content analysis related to different categories for data analysis and the categories define related aspects of theory being tested. For the purpose of this study, the researcher let the categories develop from theoretical knowledge in literature (Dawson, 2009) and later tested the data based on field knowledge using experts in the Expert Panel and interviews. This analysis enabled researcher to have data emerge based on content for the future analysis.

The content analysis for this study started with the first phase of data collection (the expert panel) through obtaining expert comments and categorising in accordance with the key components of the model. In the second phase of the data analysis, the data was captured using field interviews conducted with the experts in the area of interest. The content analysis was performed after all interviews were completed and the data was extracted in transcripts from each interview. Afterwards, data collected from each interview was analysed to identify common elements of the interviews.

It is important to note that in qualitative research analysis, the researcher is likely to use other methods for analysing the data that might be more sensitive to emergent categories and interpretation (Ezzy, 2002). Hence, for the purpose of this thesis, the researcher used content analysis as part of data analysis to identify the content within the data (Ezzy, 2002).

4.6.2 Interpreting data

To interpret the data, a few steps were followed in line with those suggested by Williamson (2002):

- **Transcribe the data:** The data was recorded for both data collection stages. This included audio recording of interviews, recording notes, creating electronic documents to capture interview and expert panel details and so forth. The recorded data was later transcribed and compared for consistency. This was to ensure that the information was accessible, allowing effective data management for later analysis.
- **Go through all transcripts to familiarise:** This is an important step in data interpretation and the researcher read through all transcripts, notes and other forms of data recording. This enabled the researcher to understand the data correctly and become familiar with the overall data before the analysis began.
- **Create data categories:** For the purpose of creating categories, the researcher used a code and retrieve process to understand the depth of data and comprehend the significance of certain issues relating to the data. This was done by grouping data into several different categories and establishing relationships between each of those categories.
- **Playing with ideas:** A researcher can play with ideas at any given time. This enables the researcher to think about and consider data in different ways and gain deeper understanding about its relativity and significance. For instance, common words, phases, and ideas propagated by participants could be used by the researcher for the data analysis.
- **Writing memos:** A memo is a document that a researcher can create to illustrate ideas and information throughout the data collection process. This generally involves taking notes in the interview to transcribe the discussion.
- **Conceptually organising the categories:** It is appropriate for the researcher to categorise the data before conceptually organising it. The initial categorisation of data was completed based on the literature review and presented as the first iteration of the

conceptual framework/model. It is also important to continually organise the categories throughout the research process.

- **Undertake word searches:** Identification of common words or phrases that are frequently used is important. In this study, a word search was not applied as, while the process is useful, it was not critical for the analysis.
- **Form tentative theories:** After completion of the previous steps, the researcher should write a statement and theories based on the data accumulated from study. Practically, the researcher revised the conceptual framework based on each data collection process.
- **Ask questions and check hunches:** The final step in the process is to validate the statements and theories and the feasibility of the study before compiling the final report. The researcher should check references and supporting evidence for the statements, theories and any evidence that suggests contrary theme. For the purpose of this study, the changes made in the framework/model were based on the data that had been gathered.

4.7 Summary of the research approach

This section elaborates on the research methodology used in the research study. This was an interpretive study using qualitative data collection techniques. In the first phase of data collection, a modified Delphi method was used involving several experts along with participants from small and midsize businesses. In the second phase of data collection, a case study analysis technique was used. Seven experts from six organisations were interviewed to gain insights into their ERP implementation experiences in the context of the proposed ERP adoption model. Figure 4.2 summarises the research approach applied.

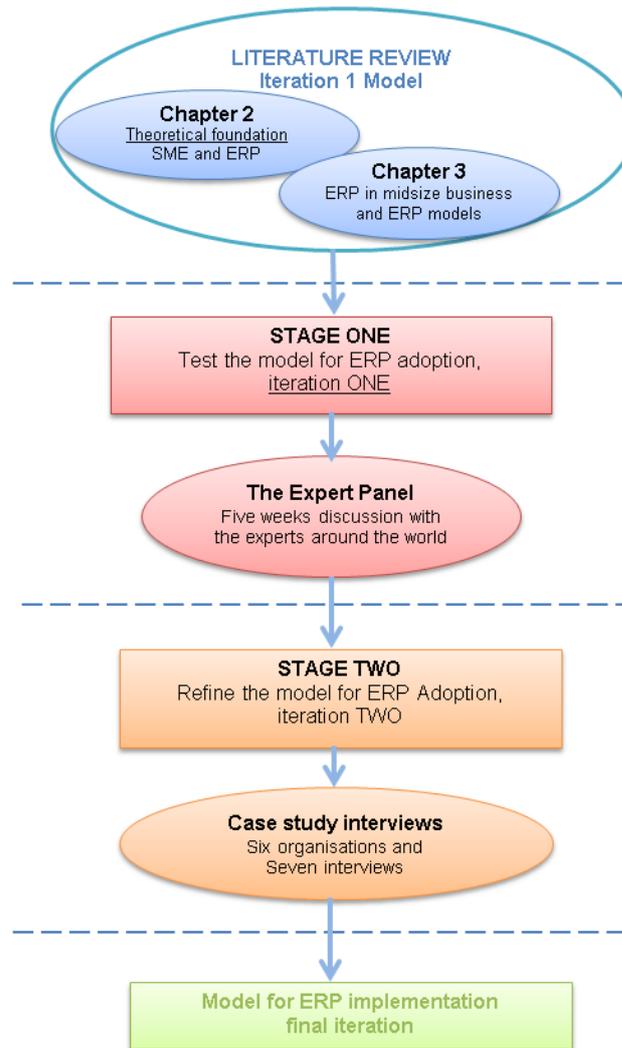


Figure 4.2: Research approach towards model development

4.8 Validity and generalisability

To ensure quality in the research findings, there are two approaches; validity and generalisability (Gibbs, 2007) are discussed below.

4.8.1 Validity

Validity means the accuracy of research findings. According to Maxwell (2002), validity has been debated amongst scholars in relation to the legitimacy of qualitative research study. It relates with the consistency of results, policies and programs or predication. If qualitative research does not comply with such consistency then the reliability of findings would be an

issue. Maxwell (2002) also suggested that validity pertains to data, conclusion and analysis, completed by a method with a particular context for a purpose.

There are several ways to deal with validity challenges, both in qualitative and quantitative research. Researchers using quantitative methods, in contrast to qualitative researchers, generally deal with expected and unexpected risks to the validity of findings. For instance, Maxwell (2005) argued that qualitative researchers rarely have the benefit of planned comparisons or strategies for sampling or statistical data manipulations. Consequently, researchers should rule out validity threats after research initiation by establishing alternative hypotheses for the evidence collected.

Two major risks to validity were identified (Maxwell, 2005) and they commonly relate to qualitative research techniques. These are:

- **Researcher bias** - this takes place when data is selected based on the researcher's existing theory or research interests.
- **Reactivity** – this is the influence a researcher could have relating to the setting or individual studies.

Maxwell (2005) further argued that procedures or methods do not ensure validity, yet they are important to mitigate the potential risks associated with validity and increase the credibility of results. For the purpose of this study, the researcher used secondary data (literature), an online expert panel and case study interviews to support the validity of results.

4.8.2 Generalisability

Qualitative research does not usually allow a systematic generalisation to a wider populace, in contrary to quantitative or experimental studies. Generalisability is defined by Maxwell (2002) as the extent or a level to which one expands the account/finding to another person, time or setting beyond the actual account studied (Maxwell, 2002). According to Yin (1994), generalisability is often based on theoretical assumptions that lead to simplifying similar situations and the drawing of conclusions. It is recognised that sampling is important for a researcher to establish interfaces from actual facts based on person, event or activity observed at first instance against the other facts, event, situation and/or people at later times (Maxwell 2002). It is generally unrealistic to expect that a researcher would observe all aspects of a research study at a given time with the small setting with reference to the study.

Maxwell (2002) highlights two aspects of generalisability, as follows;

- **Internal generalisability:** This includes generalising within the setting, community, group or institution studied as part of research to the person, event or setting that were not directly included or involved.
- **External generalisability:** This includes generalising beyond the group, context or time that was not studied directly in research.

For the purpose of this thesis and research study, both types of generalisation were considered. The researcher is not claiming that the outcome of this research will absolutely apply to all cases discussed; however this study provides an opportunity for the reader to make judgements on the applicability of the findings. The researcher does believe that as the model was extensively tested using qualitative data analysis techniques (the expert panel and case study interviews), elements of the model will be useful for midsize businesses considering implementing ERP applications. As data was collected from experts around the world, it is assumed that the elements of the model or findings would be beneficial or applicable for midsize businesses in other countries as well. It is reported in the literature (Schofield, 2002) that case study analysis or a multiple case study approach could increase the generalisability of qualitative research. This research technique was used in the second phase of this study but the data was only collected in Australia, from the state of Victoria.

4.9 Chapter summary

This chapter provides an outline of the research methodology employed for this study. At the beginning of this chapter, several methodological approaches were discussed. For the purpose of this thesis, modified Delphi and case study approaches were used. More details on the associated expert panel and case study interviews were also provided. In addition, this chapter provided a brief review of the advantages and disadvantages of different approaches and the content analysis used to analyse data. The chapter also provided a discussion on the expert panel processes followed to select and conduct the study. In addition, an understanding of the selection of case study interviews and the process used to conduct interviews was provided. In the next chapter, the first data collection phase (the expert panel) is discussed in detail.

Chapter Five

Expert Panel

5.1 Introduction

This chapter focuses on the first data collection stage and provides details of the development and execution of an online expert panel. The first section outlines the expert panel approach used to select and engage with experts for this exercise. In the later part, I talk about the structure of discussion, the discussion key points and the patterns of discussion. Finally, I elaborate on the comments made by different experts on each topic and will discuss their relevance and impact on the revision of the ERP adoption model.

5.2 Section one: Expert panel development

To ensure an effective analysis, experts from academia as well as ERP professionals were selected to be on the panel. Diversity was also important, so experts from around the world were contacted using different means, including electronic mail, personal contacts and so forth. In this section, the setup of the expert panel via online bulletin boards is discussed, as well as the process used to present and review the model contents over the five-week period of discussion. Some light is shed on technical issues faced during the development and execution of the expert panel study.

5.2.1 Selection of experts

For the purpose of this research, it was important to ensure diversity in selecting experts with a wide range of experience in both ERP and small midsize businesses. It is generally understood from the literature that even though best practice knowledge exists, it is often ignored. This causes ERP project failures (Rao, 2000; Vandaie, 2008; Tsai et al., 2012). It was important for this study to seek diverse opinions and a variety of feedback on the topic and the proposed model content. After an initial investigation into their suitability for the purposes of this study, a total of 38 experts were short-listed. Primarily, the selection criteria was based on following:

- **Academic experts** with teaching and/or research experience with ERP and/or ERP implementation and/or experience with midsize businesses. Research experience with ERP in midsize businesses would be advantageous.

- **Professional experts** with project management experience and/or ERP project management experience and/or experience with ERP implementation and/or implementation of ERP in midsize businesses.

Fortunately, the short-listed experts (researchers and professionals) had a wide range of backgrounds relevant to the criteria. Table 5.1 provides a clear picture of the experts classified within their relevant areas of expertise. The table also identifies the experts who were contacted and those who actually participated in the discussion.

The main means used to contact these experts were as follows:

- **Personal contacts:** Experts who were personally known to the researcher included those with rich project management and/or ERP implementation experience. The basic criteria used to select from the personal contacts included years of experience in the field of project management and professional exposure on ERP implementation or in the relevant areas of implementation.
- **Professional contacts:** Experts were also selected based on their professional knowledge and associations with the researcher. The basic criteria used to select from professional contacts included years of experience in the field of ERP implementation or project management, expertise in small and midsize businesses, academic professionals from ERP education and ERP project managers.
- **Academic journal articles and conference papers:** Some experts were selected from the latest research publications on ERP implementation issues, specifically in relation to midsize businesses. It was important to include academics in the study with active involvement in ERP research, to discuss the model structure and allow for peer review of its content.
- **Academic contacts:** The academic contacts were selected based on their project management methodology experience, the knowledge of ERP applications, ERP implementation and relevance of ERP applications in small to midsize businesses. The researcher presented a paper at an international conference in the United States of America (USA) in 2009, followed by another conference on ERP in Poznan, Poland. These two conferences provided an opportunity to interact with a wide range of researchers from around the world and discuss the research topic. This enabled the researcher to establish some good contacts that were later used to select experts in the area for this study. It was important to obtain an academic perspective on the model findings, so that the theoretical basis could be investigated.

- **Academic contacts of the supervisor:** Some of the academic contacts were suggested by the research supervisor. These were based on their contribution to academia, specifically in the areas of project management, ERP application and small and midsize businesses.
- **Professional networking site (www.linkedin.com):** Finally, the professional networking website LinkedIn was used to attract experts in the area. A research brief was posted on different online forums: ERP project management, ERP applications and ERP in small and midsize business forums. The posting contained an introductory message along with an invitation to indicate their willingness to participate in the study. It was also mentioned that basic criteria needed to be met before an expert could be included in the study. The criteria identified on the LinkedIn forums included years of experience in ERP implementation, areas of expertise in ERP (e.g. technical experts, functional experts, architects and/or project managers), with small to midsize business experience listed as highly desirable.

Establishing the expert panel – the process

Three attempts were made to complete the final list of experts who eventually participated in the expert panel. The first attempt occurred in the first week of April 2010, when a total of **nine experts** were contacted via professional and personal contacts, requesting them to participate in the study. As a result, only two professionals and one academic accepted the request and three professionals and three academics failed to respond.

In the second attempt, a total of **ten** different experts with academic and/or professional backgrounds were contacted. The selection was made based on a list of authors from academic journals, conference papers and academic peer publications. As a result, only two academics responded positively and agreed to participate and the rest did not respond. In addition, the research brief was posted on the following LinkedIn communities:

- ERP project management
- SAP ERP consultants
- Project manager community
- ERP Middle East

The research brief provided baseline information on research objectives, requesting experts to provide an expression of interest, should they wish to participate in the study. It was clearly stated that their professional knowledge and experience would need to be verifiable.

Eventually, some professionals were short-listed based on their professional expertise and relevance to ERP implementation (general or specific to midsize businesses). This process provided a total of five ERP professionals from different parts of the world who were considered for the study.

In the third and final attempt, a total of **seven** experts were contacted based on selected from academic journals and supervisor recommendations. Three academics responded positively and agreed to participate in the study, while other four did not respond. By the end of April 2010, a potential panel of thirteen experts from different areas of expertise was developed.

At the end of the informal short-listing process, all confirmed experts were formally contacted to request their participation in the study. An introductory email containing research information, describing the aim of the study and the expectation from each expert was outlined. The experts were requested to respond via email to confirm their intention to participate. Email was used as the medium of communication, given that experts were selected from different parts of the world.

A total of thirteen formal invitations were sent, but eventually only eight experts took part in the research study. One of the experts, “expert K” (see Table 5.1) suggested a few other colleagues for discussion but they could not participate due to work commitments. The two professionals, “expert A and expert L” and two academics, “expert G and expert I” did not participate in the expert panel due to personal and work commitments.

Table 5.1: A summary of experts' selection details for this study

No.	Expert code	Position/title	Country	Area of Expertise			
				ERP	ERP implementation	Midsized business	ERP in midsized
1.	A	Senior project manager – ERP applications	Australia	✓	✓		
2.	B	Head of ICT services and ERP applications national oil company	UAE	✓	✓		✓
3.	C	University professor info systems and team chair	USA	✓		✓	
4.	D	Software consultant, ERP implementation	Poland	✓	✓	✓	✓
5.	E	Senior Lecturer of ERP Applications	Australia	✓	✓		✓
6.	F	Senior ERP consultant at multinational company	USA	✓	✓		
7.	G	University ERP professor	Germany	✓	✓		
8.	H	ERP implementation consultant	Argentina/ South America	✓	✓	✓	✓
9.	I	Lecturer in small and midsized business	Australia	✓		✓	✓
10.	J	Senior lecturer and researcher IT project management	UK	✓		✓	✓
11.	K	Researcher – small business and ERP	Muscat, Oman	✓		✓	✓
12.	L	IT manager and ERP certified professional	India	✓	✓		
13.	M	Certified project manager and senior software engineer	Australia	✓		✓	✓

*Note - Experts indicated in **red** did not participate, even after accepting an informal request, due to other commitments.*

Expert panel execution

After having formal invitations accepted by the participants, each participant was provided with an Expert ID (to log in and be identified by). They were also requested not to divulge any personal information to identify them in the expert panel discussion forum. This was to ensure that experts did not reveal their personal identity, but could see what messages other experts were submitting to the forum. All experts were requested to must use their expert ID while submitting their response on topics of discussion. Strict privacy measures were adopted to avoid any bias or personal interest on the topic and to ensure freedom of expression to all participants while participating in the discussion. The expert panel was executed on a weekly basis, each week containing a major aspect of the research model for discussion.

The panel discussion commenced on the 3rd of May 2010 and was completed on the 7th June 2010. Each new topic was posted on a Tuesday and discussion was completed on the following Monday. At the start of each week, an email was released to initiate the discussion, followed by two reminder emails to request participation. Experts who were not able to comment during previous week(s)' discussions were able to submit comments on the previous topics as well as on the current topic under discussion. Almost half way through each week, a *friendly* reminder was sent out to reiterate the significance of the experts' involvement in the discussion and to request a timely response. It was observed that some participants posted comments on the first day of discussion and others through the week or towards the end of each discussion week. Most of the experts commented within the allocated timeframe and a few provided a collective response at the end of discussions.

5.2.2 The online interface

An online expert panel interface was developed using a free 'blog' hosting website (www.WordPress.com). This website used an online content management system (CMS) for its blog publication and management and was powered by PHP and MySQL with plug-in architecture and templating systems. The online discussion forum was hosted at: <http://erpnmidsize.wordpress.com/>. After an initial review of the CMS website, a suitable template was selected in March 2010. The reason for using this CMS website for the expert panel was due to its interactive operability, free hosting facility and the tagging/comments posting support. The online discussion forum consisted of six pages, containing five weeks of discussion material along with an introduction page providing a research overview.



Figure 5.1: A screenshot of the introduction page of the online discussion forum

5.2.3 Technical issues

Due to a lack of familiarity with the Content Management System (CMS), the researcher had to spend additional time to understand and resolve some technical issues during the development and execution of the online discussion forum. There were no other technical issues or difficulties faced.

5.3 Section two: Discussion construct

This section further elaborates on the construct of discussion and the data collection process used for the research purposes.

5.3.1 The initial model

On the first day of discussion, an initial version of the ERP adoption model for midsize business was presented for a higher level (overview) discussion. The initial version represented a composition of ERP adoption stages and the factors influencing ERP at each stage of implementation. The ERP implementation stages and the factors impacting at each stage were provided as a baseline to initiate the discussion with experts. The ERP implementation stages - pre-planning, planning, setup and re-engineering, system design, construction, production installation, and 'go live' - were presented with the specific activities to be included in each stage. The inter-relationship between the factors and ERP implementation stages were presented in a diagrammatical form and the information regarding each factor - midsize business factors, organisational, technical and people factors - were presented separately. It was also indicated that, in most cases, ERP research had been described as factor-based research (Aladwani, 2001), primarily focused on identification of factors or variables critical for ERP implementations. Other aspects of ERP research focussed on implementation stages that help understand the procedural details of ERP implementations. In the analysis, the researcher integrated both approaches to create a thorough representation of the issues relating to ERP implementation and the impact on each process or activity included in ERP implementation.

The experts were asked to analyse the representation of factors in the model and their impact on the ERP implementation stages whilst discussing their relevance and significance to the overall ERP implementation in midsize businesses. The first page of the online discussion forum provided introductory information on the research background, its purpose and objectives. A definition of midsize business from the ERP perspective was also provided to ensure consistency in the interpretation of approaches being followed by different experts from around the world. The initial iteration of the ERP adoption model for midsize business is presented in Figure 5.2.

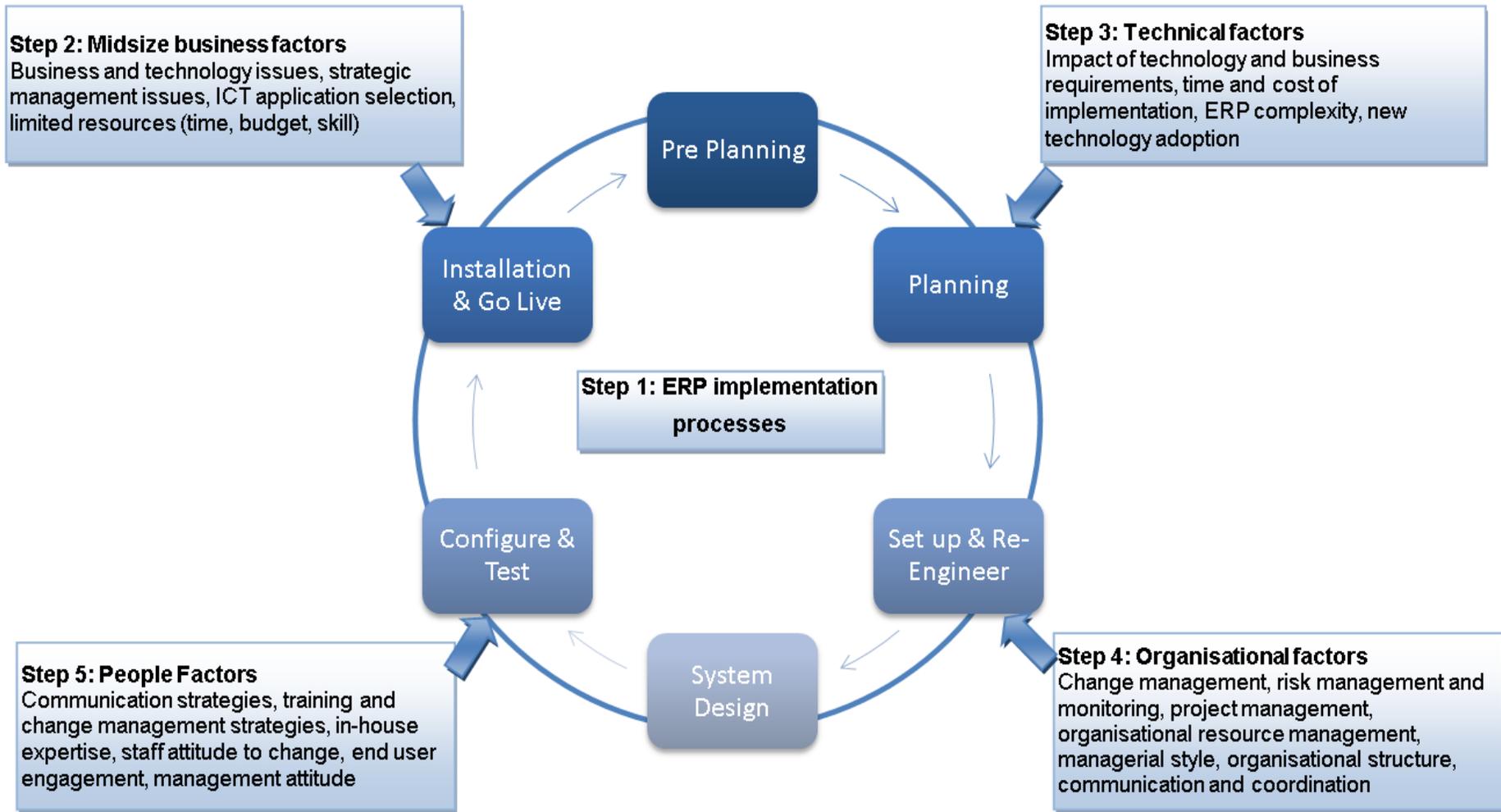


Figure 5.2: An initial model based on factors impacting on midsize business

Table 5.2: Content of literature based ERP adoption model for midsize business

Please note: The above presentation is the same as presented on page 106 (table 3.1)

Stages Bancroft et al. (1998) Parr et al. (2000)	Activities Bancroft et al. (1998) Parr et al. (2000) Markus et al. (2000)	Factors			
		Organisational Aladwani (2001)	People Aladwani (2001)	Technical Aladwani (2001)	Midsize business Barad et al. (2001), Rao (2000), Gable (1999), Rovere (1996)
Pre-planning	<ul style="list-style-type: none"> •Business case development/ project charter •Decisions leading to financial approval •Identification of key stakeholders •Formation of steering committee 	<ul style="list-style-type: none"> * Change strategies development; * Risk management 	<ul style="list-style-type: none"> * Communication strategies 		<ul style="list-style-type: none"> * Business & technology issues * Strategic management issues;
Planning	<ul style="list-style-type: none"> * ERP application selection * Project scope determination * Project team selection * Resource determination 	<ul style="list-style-type: none"> * Change strategies development * Project management * Risk Management 	<ul style="list-style-type: none"> * Training strategies * Change management 	<ul style="list-style-type: none"> * Time & cost of implementation 	<ul style="list-style-type: none"> * Criteria of selecting an IS * Accurate information * Limited resources (time, budget)
Setup and re-engineer	<ul style="list-style-type: none"> * Team structure & integration * Guiding principles * Business process analysis * Installation of ERP app * BP mapping * Team training 	<ul style="list-style-type: none"> * Organisational resources * Organisational structure * Managerial style * Organisational ideology 	<ul style="list-style-type: none"> * Staff attitude to change * Management attitude 	<ul style="list-style-type: none"> * ERP complexity * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Limited resources (budget, skill)
System design	<ul style="list-style-type: none"> * High level designing * Additional details for user acceptance * Interactive prototyping * User communication 	<ul style="list-style-type: none"> * Organisational resources * Communication * Coordination * Risk monitoring 	<ul style="list-style-type: none"> * Staff engagement 	<ul style="list-style-type: none"> * ERP complexity * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Business & technology Issues;
Configuration and testing	<ul style="list-style-type: none"> * Comprehensive configuration * Real-time data in test instance * Build test interfaces * Write & test reports * System & user testing 	<ul style="list-style-type: none"> * Information system function * Communication * Coordination 	<ul style="list-style-type: none"> * Staff involvement 	<ul style="list-style-type: none"> * ERP installation aspects * In-house expertise * Cost of implementation 	<ul style="list-style-type: none"> * Limited resources (budget, skill)
Installation and 'go live'	<ul style="list-style-type: none"> * Building network * Desktop installation * User training * System Support 	<ul style="list-style-type: none"> * Change strategies (update) * Risk management (update) 	<ul style="list-style-type: none"> * Staff attitude to change (update) * Management attitude (update) 	<ul style="list-style-type: none"> * ERP implementation issues (update) 	<ul style="list-style-type: none"> * Business & technology issues (update) * Strategic management issues (update);

5.3.2 The discussion structure

The discussion was conducted in five rounds, with each round completed in one week. In each week, a certain set of questions were asked to the panel members on different topics, related to the structure and presentation of the model content. The pattern of discussion was provided as follows:

- **Week one:** Introduction and general discussion on factors impacting on ERP implementation
- **Week two:** (Step one) ERP implementation processes and the activities in each process
- **Week three:** (Step two) Midsize business factors related to ERP implementation
- **Week four:** (Step three) Technical factors related to ERP implementation
- **Week five:** (Step four, five) Organisational and people factors related to ERP implementation.

Table 5.3 provides an overview of the discussion structure and the participation of experts at any given stage.

Table 5.3: Discussion structure and expert participation patter

Response No	Expert Response <i>Week One</i>	Expert Response <i>Week Two</i>	Expert Response <i>Week Three</i>	Expert Response <i>Week Four</i>	Expert Response <i>Week Five</i>
1.	C				
2.	H				
3.	E				
4.	B				
5.	F				
6.	J				
7.	M				
8.	D				
	End of week 1				
9.		C			
10.		C*			
11.		C**			
12.		H			
13.		B			
14.		E			
15.		M			
		End of week 2			
16.		F	H		
17.		D	E		
18.			B		
19.			C		
20.			J		
21.			M		
			End of week 3		
22.			D	C	
23.				E	
24.				F	
25.				B	
26.				D	
27.				B*	
				End of week 4	
28.				M	C
29.					B
30.					H
31.					E
					End of week 5
32.					F
33.					D
34.					M

Note: The letters (A, B M) represent the expert's ID; the number of asterisks () against each character represent the additional comments made by each expert during a given discussion week.*

The topics for discussion were designed in accordance with the model pattern. However, experts were allowed to post comments on components of the model discussed in previous

weeks. Table 5.4 provides an encapsulated view of the total number of responses received from every expert in each week of the discussion. The table also provides the total number of responses received over the period of five weeks. For instance, during five weeks of discussion, a total of thirty-eight responses were posted by eight different experts. Some comments were comprehensive, covering most of the areas of discussion and some experts provided an opinion in a few lines. It was requested that all experts provide comments based on their area of expertise with regards to ERP implementation or ERP in midsize businesses.

Table 5.4: The number of responses received from each expert across the five weeks.

Week	B	C	D	E	F	H	J	M	Total
1	✓	✓	✓	✓	✓	✓	✓	✓	8
2	✓	✓✓✓	✓	✓	✓	✓		✓	9*
3	✓	✓	✓	✓		✓	✓	✓	7
4	✓✓	✓	✓	✓	✓			✓	7
5	✓	✓	✓	✓	✓	✓		✓	7
Total	6	7	5	5	4	4	2	5	38

*Note: **Two of the experts provided comments more than once on two occasions.*

5.4 The expert panel discussion

This section presents some of the actual comments made by different experts (participants) during the panel discussion. The comments are also analysed, often resulting in changes being made to the proposed model. The comments are discussed in accordance with the pattern of discussion starting from week one to week five.

5.4.1 Week One: Model overview

In the first week, the information provided to experts was presented across two pages, as follows:

- **A home page** contained a welcome note and introductory information on the purpose of the study. It also provided some explanation on how the discussion would be conducted from week one onwards. This was followed by some background information on aspects of the model, such as ERP adoption stages and activities that should be included in each stage of implementation. Figure 5.3 provides an extract of the Introduction page;

Introduction

3 05 2010

Welcome to our focus group discussion. We will commence by showing you a model (on the next screen) that examines the factors affecting ERP adoption by midsize businesses. The purpose of this online discussion is to receive important feedback from different experts and to strengthen our ERP adoption model for midsize businesses. We will include different questions regarding the stages of ERP adoption and the factors associated with each stage having an impact on the implementation processes. We shall also analyse the significance of different predefined strategies associated with ERP implementation and their relevance to the midsize business. As a result, the proposed model will be further refined and tested with an objective to deliver it as a blueprint or guide for midsize businesses.

ERP systems have been historically associated with implementation projects in large businesses; however there has been a trend for midsize businesses to also adopt ERP systems. There has been a great deal of research carried out that specifically focused upon Large Size Enterprises and the impact of such implementations but the level of research is not that substantial on midsize businesses.

For the purpose of this study, a midsize business is defined as an organisation with 200-500 employees and/or an annual turnover of AU\$50-100 million.

ERP Adoption Stages

We are investigating the stages of ERP adoption in midsize businesses from 'pre-planning' through to the 'go live' stage. In order to do that, we have broken down these stages into the following;

- **Pre-planning:** Includes business case development, application package selection, identification of project team and all decision-making processes leading to financial approval for ERP project;
- **Planning:** Project guidelines & decisions making toward ERP implementation such as, formation of steering committee, determination of project scope, resources & implementation approach and project plan development
- **Setup & Re-engineering:** Setup includes: project team selection; selecting mix blind of people with different expertise level, teams' integration, reporting processes. Re-Engineer includes: Business process analysis, initial ERP system installation, business process mapping on ERP functions, project team training
- **System Design:** includes; high level designing, detailed designing for user acceptance, interactive prototyping with constant communication with ERP users.
- **Construction (Configure & Testing):** Software configuration, system integration, data conversion/migration, real data population in test instance, building & testing interfaces, writing & testing reports, system & user testing & transition,
- **Installation & Go live:** Post transition support to fix glitches and implementation standards, Building networks & installation of desktops (if required), User training management.
- **Later/ Post installation:** System enhancement including repairs, extension, transformation, improvements & stabilisation phases.

** You will be asked to comment on these stages during coming weeks.*

This online discussion will take approximately five weeks with an intention to cover one topic per week. Each new topic will be posted every Tuesday and will be available for discussion during the entire week. Experts who miss the discussion of any week can go back and post comments for a previous week's discussions at any time afterwards.

Let's start the discussion by clicking on **Week One: *Model Overview***

Comments: [Leave a Comment](#) »

Figure 5.3: An abstract of material presented in the first week – view one

- **The first week discussion page** contained different elements of the model. Given the fact that the primary focus of this study was on midsize businesses, a definition of the midsize business for the purpose of the research was also provided. Participants were requested to provide comments on the composition and content of the proposed model. Below is an extract of the week one “Model overview” pages (Figure 5.4 and 5.5 – view one and two).

Week One - ERP Implementation in Midsize Business

The literature outlines implementation models and strategies for large enterprises to have successful ERP implementations. This existing knowledge base is a useful starting point to develop a strategic ERP adoption model for midsize businesses. In the past, much ERP research was described as 'factor research' that mainly focused upon identifying *factors or variables* critical to ERP implementation. Other research focuses on *processes* that help understand 'how' an implementation takes place. To take advantage of both perspectives, it is important to focus on an integrated approach to have a better understanding about issues relating to ERP implementation. The relationship between factors and stages is crucial to analyse the significance of different factors with the change in each stage during ERP implementation (Markus et al. 2000). This will help to assess what factors are affecting which process during certain period of time and what impact there is on the process itself. Parr et al (2000) Project phase model and Markus et al (2000) process theory are useful tools to conduct the factor impact analysis while developing an ERP adoption model for midsize businesses.

The focus of this research is to develop an ERP adoption model for midsize businesses by critically evaluating the strategic factors and issues with respect to different ERP implementation processes in each stage. Given the various resource limitations associated with midsize businesses and the potential challenges of ERP systems adoption, this study is important in focusing on a specific business sector (midsize) as a basis for proposing a model. The resultant model will contribute to an increased understanding of implementation processes, factors, strategies and issues in relation to midsize business, enabling them to determine appropriate solution in accordance with their operational needs.

Figure 1 provides a 'bird's eye' view of the complex relationship that exists between the project implementation processes and factors (organisational, people, technical) relating to midsize business implementation.

Figure 5.4: An abstract of the material presented in the first week – view two

Factors & Strategies

- **ERP Implementation Stages** were discussed on the previous page.
- **Midsized Business factors:** Some of the midsized business factors includes; issues relating to new technology adoption and business process management, midsized business managers often lack strategic focus and broader perspective on issues with implications, plenty of promotional material available for midsized businesses but not enough specific information necessary for them to select an appropriate application, midsized businesses often have limited resources (such as time, budget and skills) to devote for IT expenditure and too restrictive selection criteria for IT application selection.
- **Organizational factors** include suitable project management, recognition of organizational structure and business ideology, change strategy development and deployment, appropriate managerial style and the communication mechanism for robust information flow within and outside the organisation.
- **Technical factors** highlights the technological challenges of ERP installation and includes the ability of an organisation to gain a thorough understanding of the systems configuration and hardware complexity requirement and the capability of technical staff to handle implementation challenges. It also includes the realistic view on access to sufficient resources (time, money, and people) necessary for implementation.
- **People factors** focuses on the ability of a business to identify and manage staff attitudes towards change, inclusion and involvement of relevant staff in the implementation process as well as an appropriate ERP training regime.

Your Comments

Please provide your comments on;

1. Are these groupings of factors (midsized, organisational, technical, people) adequate to deal with the ERP adoption challenge in midsized businesses?
2. Are there any other important factors that should be included or excluded? Please briefly discuss your view.

Note: *Participants are requested not to provide any information that might identify themselves or their organisation.*

Remember: Each type of factors will be discussed in detail in the coming weeks.

Figure 5.5: An abstract of the material presented in the first week– view three

5.4.2 Week one discussion

During the first week of discussion, the overall structure of the model was presented. Comments made by experts related to the broader aspects of the model, starting from ERP implementation activities through to factors that impact on midsized businesses within the organisational, people and technical domains. As a whole, most experts (B, F, M and D) agreed on the model content and believed that it presented a good foundation for further discussion and refinement. Comments included:

*The model looks quite good and the comments of experts can be used to refine it.
(Expert B)*

In my opinion you have done a good job to compile important factors to be considered for any ERP implementation. (Expert F)

I think you have done a nice job by identifying factors effecting mid-size businesses while implementing ERP applications. By incorporating experts' opinion the model can be further improved. (Expert M)

However, after initial comments on the model's suitability, Expert D (who was an ERP application consultant and had experience with several ERP implementations in small and midsize businesses in Poland) questioned the logic behind separating midsize factors from ERP implementation factors. It was argued by Expert D that factors listed within ERP were relevant to midsize businesses and vice versa. In addition, Expert D suggested that factors such as, 'new technology adoption', 'business process management' and 'managers often lack strategic focus' should be moved under technical, organisational and people factors respectively. In principle, all experts agreed that most of the factors were presented correctly. They also suggested some others factors for consideration. In response to the point raised by Expert D, it was argued that what had been originally proposed in the model had been done so to ensure that the identified midsize factors were analysed separately before their relevance to ERP factors could be established. Furthermore, it was important to understand midsize business specific factors clearly before relating those factors to the organisational, technical and people domains. In addition, it was observed from the literature that midsize businesses were different from their large counterparts due to their resource base limitations and strategic management issues. Consequently, establishing a clear distinction between factors was important to avoid deviation from the research focus.

Three experts (B, J, and M) discussed the interrelationship of different factors with a possible collective impact in each stage of ERP implementation. It was stated that the combined impact of factors on each stage could be correlated more than had been proposed. Factor inter-relatedness and combination of appearance could be based on particular contexts and the level of their complexity could be difficult to envisage. Situational leadership and anticipation could be crucial, provisioning quick escalation and decision making processes. These are vital, with the potential flow on effect on the ability to respond. It was also suggested that the impact of combined factors should be analysed by classifying their probability of occurrence in each stage of implementation with objectives to formulate a suitable and workable strategy. This is evident in the comment below:

I would like to see (the) inter-relationship of these factors on each implementation stage, starting from pre-planning to post-implementation review and also would like to see the impact of each factor (positive or negative) on these stages. (Expert M)

Inter-relationship of factors in the model: Experts H, J, M, E and B discussed the relevance of the factors presented in the model and suggested improvements. Activities related to standard project management best practice in the context of ERP implementation were discussed and suggestions made to include other activities, such as availability of accurate information about the business, outlining detailed scope and objectives for the implementation, past experience of the project team, political support and following industry standards (Expert H, J). Expert M (who was a certified project management professional and senior software engineer, with experience in leading several IT application projects in Australia and the Middle East) highlighted the significance of project risks and issues identification and the need to prepare containment plans within mitigation strategies. He commented:

During each implementation, project managers strive to identify associated risks and issues and action the containment plan to reduce their impact. I think if you are able to accomplish that by simply classifying the probability of occurrence of each factor in a specific stage and devise a suitable action plan, this model will really serve the need. (Expert M)

Similarly, Expert J stated that even with clearly defined project objectives, often conflicting and political issues may occur in the early stages of implementation, creating potential issues at later stages. In addition, Expert E specified the significance of change management within the implementation strategy and highlighted a need for effective and transparent communication between project teams (i.e. project leaders, team members, and end users) throughout the life of the project.

Extra organisational factors: Experts C and F elaborated on the significance of extra-organisational factors with their likely impact on ERP implementation, as explained by Expert C (who was a university professor in the information systems sphere and team chair at a university in the USA. He had experience with ERP and IT application issues with small to midsize businesses):

Items as pressure up or down the supply chain, competitive posture, industry standards, and the like often shape decisions about systems (including ERPs) and influence later stages in the design, training, and operations. (Expert C).

The substance of these factors was evident from the ERP knowledge base (the research literature). However, their relevance to midsize businesses required exploration. This concept reinforced the perception of generality in ERP implementation without considering the actual

size of a business. It was important to note that when midsize companies acquired another company (or vice versa), the potential impact on an ongoing project scope, cost, complexity and other challenges faced by the implementation team could be enormous. Expert F explained:

I will suggest adding a few more, such as merger and acquisition, e.g. recently it has been noticed that many mid-size organisations have bought new companies and it has made some significant impact on overall scope, cost, complexity and challenges in ERP implementation. (Expert F)

Macro environmental factors: Experts F, J and D discussed the relevance of macro environmental factors, due to global implementations of ERP applications. Expert F (who was a senior ERP consultant at a multinational company in the USA, with professional implementation experience in ERP applications and in several ERP implementations) stated that a macro environmental analysis should be conducted based on the social, geographic, political and legal environments of the midsize business. Furthermore, Expert J (who was a senior IT lecturer at a University in UK, with research experience in IT project management best practice, with expertise in IT project implementation in small and midsize businesses) commented on geographic spread factors. Expert J stated that this could add layers of cultural issues at the sub-organisational, organisational and national levels. Moreover, according to Expert D, environmental or context factors outside of the project or the organisation (e.g. a change in law) could potentially impact ERP implementation.

Comments made by all experts were considered and included in the detailed description of the model for later discussion. This was also designed to further validate their comments and to align them with the topic of discussion.

5.4.3 Week one analysis

In the first week, baseline information on the construct and key points of the model was discussed. The experts were requested to provide their opinion on the scope of the discussion during upcoming weeks. A high level contents diagram was also presented, illustrating the factors identified from the literature.

General comments made were related to factors impacting ERP implementation along with recognising model composition and implementation activities. Experts B, E and F appreciated the groupings within the model and endorsed them as adequate for midsize businesses while

suggesting some additional factors. Furthermore, Experts B and M indicated that refining and improving the model by incorporating expert opinion would be a good strategy. Expert D called the proposed model a good starting point for a valuable discussion.

ERP implementation factors and strategies

Midsized business factors

The factors included in the first week served as a starting point for the detailed discussion in later weeks. Other factors suggested included: issues related to new technology adoption and business process management; lack of strategic focus and a broader perspective on issues by business managers; lack of information necessary for decision making towards ERP; scarce resources for IT infrastructure (such as time, money, technical knowledge); and restrictive selection criteria for IT applications selection. Below is a summary of factors proposed by different experts and the reasoning behind their inclusion or exclusion in the model:

- 1. Cultural and environmental/context factors:** Experts D and J suggested the inclusion of “cultural and environmental/context factors” and argued that these factors might be external to the project and/or the organisation but would have an impact on ERP implementation (e.g. any government or regulatory changes). Therefore, they argued, these should be considered. In addition, Expert F and J suggested that “macro environmental factors” could add further layers of cultural issues (such as, sub-organisational, organisational and national). Due to the global (physical or virtual) operational requirements of midsized businesses, factors such as social, geographic, political and legal environments of different regions should be considered. The comments made by experts were valid and their significance had been recognised within the literature on macro environmental, cultural and context factors (Haddara & Zach, 2011; Alshamaila, 2013). The impact of these factors on large-size enterprises was evident but further investigation on their likely impact on midsized businesses could be beneficial. Consequently, these factors were included in the revised model for further analysis and discussion.
- 2. Correlated factor impact:** Experts B, J and M discussed the possible impact of different factors in a correlated manner. It was indicated that the factors sometimes repeat at different stages of implementation and that their impact could be far more correlated than originally proposed. The interrelatedness of factors could be context-based, enhancing the complexity in implementation with a negative impact on an

organisation's ability to respond. It was further added that in such situations, escalation and decision making processes are crucial. These comments highlighted the need for identification of a mechanism that could help to measure the inter-relationship of these related factors in each stage of implementation. Within the scope of this study, an attempt was made to provide a holistic view of all relevant factors and further research specific to those areas could deliver detailed understanding. Hence, factors relationships would not be discussed in detail within the scope of this current research analysis.

- 3. Situational leadership for risks and issues management:** Expert B (who was head of ICT services and ERP applications in a national oil company in the UAE and had professional experience with several ERP application implementations) acknowledged the need for effective situational leadership and anticipation during ERP implementation. This comment was seconded by Expert M and it was further suggested that project leaders strive to identify related risks and issues during an entire project and, therefore, an effective containment strategy should always be developed upfront. Significant impact of risks and issues to the project cannot be undermined. Consequently, factors related to situational leadership should be included for detailed analysis within ERP in the midsize business sphere.
- 4. Mergers and acquisitions:** Expert F (who was a senior ERP consultant in a USA multinational company) highlighted an issue related to mergers and acquisitions during the course of ERP implementation. It was stated that in a situation when a midsize business merged with another company, the implementation project could experience significant scope, cost and other complications. These complexities relate to business process integration, data migration and other business applications integration. Given the size and nature of midsize businesses, the related risk of "mergers and acquisitions" would be apparent and, as a result, should be included as an important issue for further analysis.

Organisational factors

In the first week, some organisational factors were presented to initiate the discussion. These factors were: suitable project management; recognition of organisational structure and business ideology; change strategy development and deployment; appropriate managerial style; and the communication mechanism for robust information flow within and outside of the organisation. In response, experts commented on the significance of those factors and suggested additional factors to be considered for inclusion. Below is the list of these newly

suggested factors along with the justification for their inclusion or exclusion from the research model.

- 1. Extra organisational factors:** Expert C suggested that factors with possible up or down pressures on supply chains, competitive positioning, and industry standards were of significant importance. The importance of these factors was apparent whilst ERP application selection decisions were being made. Due to the significance of extra organisational factors, these were included in the revised model under organisational factors.
- 2. Organisational knowledge:** Expert H (who was an experienced ERP consultant from South America with several ERP implementation experiences in small, midsize and large organisations) stated that there has always been a substantial need for the existence of organisational knowledge while implementing ERP applications. This knowledge should be related to the type and nature of business, business process knowledge, the technology and applications use, work psychology and other related work methodologies. This knowledge could exist in either internal organisational documentation or by triggering an investigation within the ERP implementation requirement gathering phase. The research literature (Rao, 2000) also highlighted the need for knowledge acquisition at the start of implementation and, therefore, it should be included in the model for further analysis.
- 3. Political support:** Without appropriate political or senior management support, projects may not be effectively delivered as originally expected. Expert H suggested that political support needed to be considered as one of the key factors during the analysis. As the significance of political support was evident in the literature (Nguyen et al., 2013), it was included in the model for further consideration.
- 4. Clear and well defined objectives:** Expert J and H signified the need for clearly defined objectives. In addition, it was noted that sometimes clearly defined objectives conflict or are politically biased during the early stages of implementation. Hence, incomplete, incorrect or biased information could cause issues at the later stages of ERP implementation. Similar to organisational knowledge and requirements validation, a need to clearly outline well-defined project objectives was crucial. Thus, these factors were included in the model for further analysis.
- 5. Effective communication:** Expert H highlighted the significance of effective communication during the entire life of the project. Effective communication and coordination could be the key to project success. Consequently, factors related to communication and coordination were left in the model unchanged.

6. **Risk planning:** Expert H highlighted a need for risk analysis and effective risk planning at an early stage of ERP implementation. Due to the significance of risk management, these factors were already included in the model, as specified under the pre-planning and planning stages.
7. **Project monitoring and control strategy:** Effective project monitoring and control was identified as significant in an ERP project. Expert H expressed the need for an effective project control strategy and execution, with continuous follow-up and control over project activities. Due to the significance of project monitoring and control factors, these were included in the model after the planning stages, through to the closure stage.
8. **Change management:** Expert E (who was a senior lecturer of ERP applications at a university in Australia, with significant teaching and professional knowledge and experience of ERP applications implementation) stated that change management was a critical component of ERP implementation and necessary through the entire project. Change management was also identified as a key factor of ERP implementation in the literature (Finney, 2011). Therefore, it remained included in the model for later analysis.

Technical factors

In the first week of discussion, some of the key technical factors were presented, being: technological challenges of ERP installation, including the ability of an organisation to gain a thorough understanding of the systems configuration; hardware complexity requirements; the capability of technical staff to handle implementation challenges; and a realistic view on necessary resources (time, money, and people).

As a result, the experts confirmed the existing factors and suggested a new factor for discussion, as below.

1. **Industry standards:** Given the fact that ERP functions were identified as based on industry best practice business processes, Experts C and H suggested considering industry types during ERP implementation. It was also suggested during the discussion that, while making ERP application selection decisions, industry standards should be adhered to and these should eventually influence later stages of implementation (e.g. design, training and operations). As the significance of ERP industry standards was evident, these factors were included in the model for further discussion and analysis.

People factors

In the first week, some people factors were discussed. These factors were: the ability of business to identify and manage staff attitudes towards change; inclusion or involvement of relevant staff; and the need for appropriate levels of ERP training. In response, some experts provided suggestions to improve the list of people factors. Below is the summary of factors discussed and recommended by different experts.

- 1. Team competence:** The competence of project teams and their technical excellence could be crucial to ERP implementation. According to Expert H, the level of experience and seniority of project team members should be considered. Due to significance of suitable team structure and team competence, these factors were included in the model along with training strategies and staff attitudes.
- 2. Clarity in communication:** Experts E and H signified the importance of clarity in communication during the entire project life-cycle. It was indicated that communication should be transparent and focussed on internal team and external organisational levels. The factors related to communication already existed in the model and were retained. These included communication strategy development, an effective team communication, transparency in team communication and communication clarity.

5.4.4 Week one summary

In the first week of discussion, an overall structure of the model was presented. The experts appreciated the effort put into the model and provided constructive comments on the model design and its constructs. An introduction to the study was provided along with high level information on the ERP adoption stages. The stages listed for discussion were: Pre-planning, Planning, Setup & Re-engineering, System Design, Construction (Configure & Testing), Installation & Go live, Later/ Post installation. Information on the complex relationship that exists between implementation processes and related factors of ERP in midsize businesses were elaborated. Expert D queried the reason behind separating midsize business factors from ERP implementation factors specified in organisational, people and technical domains. It was argued that the factors listed in ERP implementation domains were also relevant to midsize businesses. Overall, the experts agreed with the model content and its design and stated that after incorporating expert opinion it would be improved and be beneficial for midsize businesses.

When the discussion started, the experts started suggesting new factors relating to midsize business experiences as well as general ERP implementation factors with reference to the

organisational, technical and people domains. These new factors were recorded in *red text* to reflect their new addition in the model. As the new factors were suggested at the beginning of the Expert panel, the new changes were included in the model along with the existing factors to avoid repetition in discussion in the following weeks. Table 5.5 provides an encapsulated view of the factors presented for discussion after week one, containing literature defined factors (refer Table 5.2) along with the new factors, specified in the red text. It is important to note that the *column sequence* of Table 5.5 has changed by relocating midsize business factors ahead of standard ERP implementation factors in the domain classification. This decision was made to ensure that the discussion would start with midsize business related factors before domain classification factors were considered. Based on Expert D's comment, the similarities between midsize business and general ERP implementation domain factors will be discussed at the end of this chapter and a refined version of the model will be tested in the next data collection stage, 'Case Study'.

Table 5.5: Updated version of the ERP adoption model after week one Expert Panel

Stages Bancroft et al. (1998), Parr et al. (2000)	Activities Bancroft et al. (1998), Parr et al. (2000), Markus et al's (2000)	Factors			
		Midsize business (Barad et. al 2001, Rao, 2000, Gable 1999, Rovere 1996)	Organisational Aladwani (2001)	People Aladwani (2001)	Technical Aladwani (2001)
Pre-planning	<ul style="list-style-type: none"> •Business case development/ project charter •Decisions leading to financial approval •Identification of key stakeholders •Formation of steering committee 	<ul style="list-style-type: none"> * Strong business case * External organisational factors * Macro environmental factors * Business and technology issues; * Strategic management issues; * Political support * Knowledge of the business 	<ul style="list-style-type: none"> * External organisational factors * Organisational knowledge * Political support * Change strategies development; * Risk management; 	<ul style="list-style-type: none"> * Communication strategies; 	<ul style="list-style-type: none"> * Impact of technology and business requirements
Planning	<ul style="list-style-type: none"> * ERP application selection, * Project scope determination, * Project team selection, * Resource determination 	<ul style="list-style-type: none"> * Cultural factors (local, national) * Government or regularity change * Industry standards * Criteria of selecting an info system; * Accurate information; * Limited resources (time, budget); * Project leadership (risk and issues) 	<ul style="list-style-type: none"> * Change strategies development; * Project management; * Risk management; * Risk planning and monitoring; * Effective communication * Clear and well defined objectives 	<ul style="list-style-type: none"> * Training strategies; * Change management; * Team competence * Clarity in communication; 	<ul style="list-style-type: none"> * Time and cost of implementation * New technology adoption * Industry standards;
Setup and reengineering	<ul style="list-style-type: none"> * Team structure and integration, * Guiding principles, * Business process analysis, * Installation of ERP app, * BP mapping, * Team training 	<ul style="list-style-type: none"> * Limited resources (Budget) * Limited resources (Skill); * Situational leadership issues * Issues due to mergers/acquisitions 	<ul style="list-style-type: none"> * Organisational resources, * Organisational structure; * Managerial style; * Organisational Ideology; * Project monitoring and control * Change management * Effective communication 	<ul style="list-style-type: none"> * In-house expertise * Clarity in communication * Staff attitude to change; * Management attitude; 	<ul style="list-style-type: none"> * ERP complexity; * In-house expertise; * Cost of implementation
System design	<ul style="list-style-type: none"> * High level designing * Additional details for user acceptance * Interactive prototyping * User communication 	<ul style="list-style-type: none"> * Business and technology issues; * Issues due to mergers/acquisitions 	<ul style="list-style-type: none"> * Organisational resources; * Effective communication * Effective coordination; * Risk monitoring; * Project monitoring and control * Change management 	<ul style="list-style-type: none"> * Staff engagement; * In-house expertise; * Communication transparency * Internal and external team engagement 	<ul style="list-style-type: none"> * ERP complexity; * In-house expertise; * Cost of implementation
Configuration and testing	<ul style="list-style-type: none"> * Comprehensive configuration, * Real time data in test instance, * Build test interfaces, * Write and test reports, * System and user testing 	<ul style="list-style-type: none"> * Limited resources (Budget) * Limited resources (Skill); * Issues due to mergers/acquisitions 	<ul style="list-style-type: none"> * Information system function * Effective communication * Effective coordination; * Project monitoring and control * Change management 	<ul style="list-style-type: none"> * Staff Involvement; * In-house expertise; * Communication transparency * Internal and external team engagement 	<ul style="list-style-type: none"> * ERP installation aspects; * Cost of implementation
Installation and 'go live'	<ul style="list-style-type: none"> * Building network, * Desktop installation, * User training, * System support 	<ul style="list-style-type: none"> * Business and technology Issues (Update); * Strategic management issues (Update); * Operational implications 	<ul style="list-style-type: none"> * Change strategies (Update); * Risk management (Update); * Effective communication * Project monitoring and control * Change management 	<ul style="list-style-type: none"> * End user engagement * Staff attitude to change (Update); * Management attitude (Update); 	<ul style="list-style-type: none"> * ERP implementation issues (Update);

Please Note: After the first week of discussion, only a few necessary changes were made in the model. Changes are identified in **red** colour.

5.4.5 Week two: ERP implementation activities

Figure 5.6 provides an extract of the content discussed in the second week of discussion.



Figure 5.6: An abstract of material presented to experts during second week

After an overall discussion on the model during the first week, in the second week ERP implementation activities were presented for a detailed discussion. Experts were asked to comment on the composition of activities along with their sequence appearance and the relevance of their order in the model. Below is the summary of material presented during the second week for discussion.

5.4.6 Week two discussion

During the second week of the expert panel, the emphasis was on ERP implementation activities and their sequence in each stage of implementation. In the proposed model, activities defined in six implementation stages were: pre-planning, planning, setup and re-engineering, system design, configure and test, and installation and 'go live'. Experts were asked to comment on each stage and on the predefined activities in accordance with their knowledge and experience. Most of the experts commented in terms of the staged sequence but some comments were made more specifically on a specific stage or activities within a stage. For instance, Experts M, F and D provided comments on the overall structure of the implementation stages and their presentation along with the practical sequence based on their experiences. Expert M (a certified project manager and senior software engineer from Australia), however, commented on the composition of implementation stages and activities, saying:

It seems stages and their activities are a composition of ERP implementation processes from a Project Management Body of Knowledge (PMBOK) perspective. (Expert M)

Similarly, Expert D (an ERP consultant with small and midsize implementation experience from Poland) related activities to midsize business experiences and stated that post-ERP selection decisions and the methodologies for implementation used by different implementers were similar to those presented in the model. Furthermore, Expert D suggested that these stages could be more flexible or some steps could be changed in their sequence or could go concurrently, as he commented:

This means better flexibility but on the other hand it is difficult to control a project where all stages run concurrently. (Expert D)

Similarly, Experts F and M noted that ERP vendors/implementers have modified versions of their own implementation methodologies, which might differ in stage sequence or activities definition. Expert F also suggested some changes as follows:

In my view, “setup and system design phases” can be joined and named as the “Build” phase where detail “AS-IS” and a requirement study should be done followed up by the configuration and training. (Expert F)

Expert F (a senior ERP consultant in a US multinational company) also suggested including an independent testing stage that could manage different levels of testing, such as unit testing, system testing, regression testing and integration testing, followed by user acceptance testing and so forth. These test stages should be considered after build stage completion.

The following provides a summary of changes within each of the stages of the model as determined after week two panel discussions.

Pre-planning stage activities: Experts F, C, H, and D commented on the pre-planning stage and discussed activities that should be considered within it. Experts also suggested changing the sequence of some activities For instance, activities such as application selection and project scope determination (Experts F, H) and networking with top level project team members (as identified in the project charter) (Expert C) should be completed in the pre-planning stage. Expert H noted:

I think the ERP Application Selection activity should be in the Pre-Planning Stage because it's necessary to know the technical and functional benefits of the ERP application before its selection. (Expert H)

In addition, it was argued by Expert C (who was a US university professor in information systems) that activities such as team building, objective responsibility agreements, problem solving process establishment, conflict identification and resolution procedures, and continuous improvement plans should be included in the pre-planning stage. Comments made by Expert D were specific to the midsize business experiences, as follows:

As there are many valuable remarks added, I would try to focus on how it is in medium-size business. First of all, mostly because of lack of experience and resources (in my region midsize business usually selects the first ERP identified) pre-planning and

planning phase are completely mixed and there is no steering committee or stakeholders identification. (Expert D)

Similarly, Expert D stated that the midsize business representatives responsible for ERP selection decisions would not normally identify key business processes required for the implementation. In addition, ERP selection decisions have been made on effective pre-sales presentations rather than real requirement identification. Therefore, Expert D highlighted a need for identification of key business processes in the pre-planning stage before any ERP selection decision is made.

Planning stage activities: Experts F, M, C, and H commented on the activities defined under the planning stage in the model and provided suggestions for improvement. Experts F and M suggested that activities such as developing guiding principles, team structure, and stakeholder management should be part of the planning stage. Expert C commented on project team development and indicated that:

“Team structure and integration” and “project team selection” seem reversed. Though some of the team is selected very early, the bulk should not be selected until the structure is set. (Expert C)

Similarly, Expert H (an experienced ERP consultant from Argentina) highlighted the significance of project scope control and stated that it is crucial to determine the metrics being used during project planning, as well as outline the change control process (e.g. change requests) for effective scope management. Expert E indicated that at some stage, system/project scope must be frozen or locked and an appropriate change request procedure should be established for effective change control. This should only be based on business critical changes, necessary to for delivery within the project capacity. Expert M pointed out the need for an ERP implementation governance strategy and that activities performed by a contractor (implementer) should correlate with activities performed by the company for effective resource management.

System design, setup and re-engineering activities: Most of the experts acknowledged activities defined within the system design, setup and re-engineering stages. However, Expert F proposed a merging of the setup and system design stages into a *single stage*, named the “build phase”. It was also suggested by Experts F and M that requirement analysis and expectation management should be completed in the same stage followed by configuration and training. In addition, Experts C and M highlighted the need for an early identification of

training requirements. It was later suggested that technical resource training and identification of staff for end user training should commence from the setup and re-engineering stages and continue until staff training is completed. According to Expert C,

Should it [training] be extensive then it would need to be part of an earlier phase. This is especially true for SMEs that have to be more creative in the assignment of scarce resources. (Expert C)

Configure and test stage activities: Experts B, H, E and F commented on the context of midsize business implementation and specified the significance of testing, its stages and the different types of test environments required. Expert B pointed out the geographic and cultural impact on testing exercises and stated that:

While the implementation steps are indeed relevant, there are several cultural adaptations that are to be accounted for. For example, in the Geography that I represent, it is hardly ever possible to get Users time to be involved in the testing or for that matter on any major activity on an ongoing basis (Expert B)

Furthermore, Expert B suggested a prototype oriented or pre-fabricated model to cater for the challenges of cultural obstacles during application testing processes.

Similarly, Expert H argued that the activity “real-time data in test instance” would not happen in midsize businesses but it could be accomplished in parallel with actual system testing. In the test cycles, some integrated business cases should be selected and thoroughly tested by the team. In addition, Expert F provided some insight on test processes, starting from unit to system integration testing (testing of the entire process), that should be performed thoroughly and followed by formal user acceptance testing (UAT). Similarly, Expert E emphasised end user commitment and the need for early user training so that they should be ready for productive UAT. According to Expert E,

In many cases they [end users] still have responsibilities to fulfil during the implementation stage. These people must be given training early in the process to enable them to develop test scripts that will be used to give final approval of the system. (Expert E)

Once the testing processes along with UAT are completed, the production and ‘go live’ processes should start and be completed accordingly.

Installation and 'go live' activities: Experts H, B, M and F commented on activities related to the final stages of ERP implementation, naming this stage "closure". The purpose of this was that all activities defined under the installation and 'go live' stages in the model were commonly related to project closure. Expert H even suggested that the Closure stage should be used for effective control (regardless of whether or not the project met its scope requirements satisfactorily) and to capture lessons learnt from good or bad experiences in execution. Expert F suggested considering cut-over activities in the final stages of implementation to make the production system ready to use. These activities, Expert F indicated, would include:

Loading all sorts of master and transactional data, any manual work to make the system ready and verification of the validity of data loaded as part of cut over (Expert F).

Similarly, Experts B and M suggested that the closure stage should be performed for expectation analysis and to investigate whether predefined benefits in the business case were realised. As Expert B stated:

Closure is not just the delivery of a system, but derived from the realisation of benefits highlighted in the business case. Therefore a periodic post-implementation review is essential to the success (Expert B)

Experts B and M also highlighted the significance of the post-implementation review and stages such as 'shakedown' and 'stabilisation', 'continuous improvement' and 'enhancement' phases of ERP for consistency in the ERP support structure. These would help strategize for future application upgrades or enhancements as needed. In addition, Expert F stressed a need to define "support procedures", consisting of activities such as setting up priorities for problems/issues, continuous improvement, post 'go live' training, approval mechanisms to handle post 'go live' issues and so forth. Expert M also expressed the need for post-implementation activities from the perspective of the business/client rather than from the contractor's point of view. It was also stated that the responsibility of an implementer finishes once the system goes live and the real challenge for the business or client relates to the support of the application.

5.4.7 Week two analysis

As already outlined, during the second week of discussion, ERP implementation stages were discussed along with their relevant activities. The purpose of the discussion was to present the best practice ERP implementation stages and their related activities for discussion. This was to obtain valuable comments from experts on activities, their sequence, stages of representation and relevance to each stage of implementation. This information was presented (refer Figure 5.4), highlighting the flow and providing brief information on each activity and its relevance.

Most of the experts discussed the sequence of activities and their relevance to a given stage. Some experts suggested new activities to be considered for analysis. Below is the detailed analysis of expert comments and their impact on the proposed model.

ERP Implementation activities

Pre-planning stage activities: In the pre-planning stage, there were a number of activities listed in the model. These activities include: business case development, project charter, decision leading to financial approval, identification of key stakeholders, formation of a steering committee and so forth. Experts C, H, F and D suggested additional activities for analysis, as follows:

1. Higher level relationship building and inter-team communication: According to Expert C, it was imperative to consider partnering with top level project team members and these members should be specified in the project charter. Activities should include team building, objective/responsibility agreements, problem solving, process establishment, conflict identification and resolution procedures, and continuous improvement plans. Expert C suggested that these activities needed to be considered during the earlier stages of implementation. Due to the significance of the content suggested by Expert C, the activities in pre-planning and planning stages have been modified in the model. From literature review, Rovere et al. (1996) highlighted benefits of effective communication, while Koch (2003) stressed the need for interteam communication and Al-Mashari et al., (2000) stated that the lack of communication would impact the outcomes of implementation.
2. ERP application selection: It was suggested by Experts F and H that “ERP application selection” and “project scope determination” activities be included in the pre-planning

stage. It was further argued that business value identification, at both technical and functional ends, should be verified before planning could start. These were valid points and the sequence of both activities was changed as suggested by the experts. In addition, Expert D commented on midsize business implementation experience and suggested that once the ERP selection decision is made, the methodology used to implement ERP would be the same as the steps defined in the model.

3. Pre-planning from the midsize perspective: Due to lack of experience and necessary resource requirements, the pre-planning and planning stages could be completely mixed up for midsize businesses. It was argued that there is no steering committee or stakeholder identification mechanism in midsize businesses and they tend to select ERP applications with unclear information (Expert D).

Based on the points discussed by different experts, there were slight changes made in the activities included in the pre-planning stage. These activities are: business case development/project charter, project scope determination, ERP application selection, decisions leading to financial approval, higher level relationship building, and identification of key stakeholders and, finally, formation of steering committee.

Planning stage activities: A number of activities were listed in the planning stage of the model, including ERP application selection, project scope determination, project team selection and resource determination. During the first week of discussion, implementation methodology and project plan development were also listed under planning stage activities.

Experts were requested to discuss activities presented in the model and provide comments for improvement. As a result, Experts B, D, F, H, and M suggested the following changes:

1. Project Control mechanism: Expert H and M suggested including activities related to project control functions, specifically identifying how change requests would be handled once project scope is finalised. In addition, it was suggested that an implementation governance mechanism for midsize businesses should be considered. The need for a control function and implementation governance mechanism was acknowledged and an “implementation methodology” activity was included in the planning stage.
2. Geography and cultural adaptations: Some cultural adaptations were suggested. For instance, according to Expert B it is difficult to involve end users in the testing or any other major project implementation activity on a continuing basis due to cultural considerations. It was suggested that a prototype oriented pre-fabricated model might

help in certain cultural environments. However, a direct relationship with the proposed model could not be established due to the model's generalised focus. Further research may be required to analyse the construct and viability of a specific model in a separate study. Similarly, Davison (2002) highlighted issues in relation to cultural mismatch especially when a geographic limitations are involved.

3. Stakeholder management: Expert M highlighted the significance of stakeholder management and suggested including it in the planning stage. An activity called "stakeholder management" already existed in the pre-planning phase but had been renamed "identify key stakeholders and manage". The stakeholder identification and management process should start at the earlier stages of the project and should be effectively managed within a communication and coordination strategy. It is understood that in effective project management, stakeholder expectations management is considered exceptionally important and therefore PMI (2013) has illustrated an entire chapter on stakeholder management while project implementation.
4. Project team setup: Expert F suggested including "guiding principles and team structure" as part of the planning stage. In response, the activity "project team selection" and "project team setup" were renamed, but the "guiding principle" was not moved from the re-engineering stage, due to the fact that this would be more relevant during functional mapping and business process re-engineering, rather than in the planning stage.
5. Planning from the midsize perspective: Expert D suggested that, generally, people responsible for ERP implementation are not able to identify the key processes to be supported by the system. Furthermore, it was suggested that, generally, selection decisions on ERP applications were not based on reflections of true requirements but rather on pre-sales presentations. Hence, Expert D suggested the inclusion of activities such as "identification of key business processes" before ERP selection decisions were made. It was also suggested that while implementing ERP in midsize businesses, the implementation stages should be flexible and activities should be executed simultaneously. This would provide optimal control as required for effective project delivery. The points indicated by Expert D were relevant and suitable. Hence, the activity "identification of key business processes" was included within the pre-planning stage before ERP application selection. For an effective project control, project methodology selection activities were retained within the planning stage.

Build stage (setup, re-engineering and system design) activities: For this discussion, activities defined within the setup and re-engineering stages were listed separately from the system design stage. The setup stage activities include team structure identification, project team selection (mix blend of resources), technical and functional staff training, team integration, and reporting processes. The re-engineering stage activities include guiding principles, business process analysis, installation of ERP application, and business process mapping. The system design stage activities include high level designing, detailed designing for user acceptance, and interactive prototype user communication. In relation to these stages, the following suggestions were made:

1. Renaming as the build stage: According to Expert F, most of the activities listed under setup, re-engineering and system design phases were relevant and could be joined together within a build phase. In addition, detailed “as-is” and requirement studies should be completed in the build phase, followed by configuration and training. This suggestion provides a valid perspective on collaboration of relevant activities. Therefore, activities within setup, re-engineering and system design were now listed within a “build stage”.
2. Project team selection and integration: Expert C suggested a reversal in the order of activities “team structure and integration” and “project team selection”. This was justified with a comment that, in general, project teams get selected at an early stage of the project but the bulk of team members do not get hired until a proper team structure is completed. This was a valid point; hence, two modifications were made in the model. Firstly, two activities were sequenced under setup (i.e. “team structure identification” and “project team selection”); and, secondly, a new activity “project team setup” was created under the planning stage to cover a higher level team selection process. Based on project management best practice protocols (PMI 2013), project team selection and team integration is critical for an effective project management.
3. Internal expectations and training: Expert M suggested that “internal expectations” should be managed along with the training issues of technical and end users during the “setup and re-engineering” stages. In addition, end user training once started in the setup stage must continue until it is completed, ideally before the start of UAT. Expert E suggested that getting commitment from critical end-users in midsize business could be crucial. Normally, end users would have other (operational) responsibilities during the project and, therefore, they should be trained earlier in the process to enable them to develop test scripts and have them approved before testing could commence. It was

further added that in most cases, system scope must be frozen and only business critical changes should be allowed after this period.

The comments made by the experts were important, thus most of their suggested activities were included in the revised model. These were: internal expectation management (under re-engineering); plan and initiate end user training (under re-engineering); perform end user training (under configuration); complete end user training (under testing); and scope freeze (under construction). The reason for including these activities was because of their significance to ERP implementation. If internal expectations mapping and staff training issues are dealt with appropriately the risk of staff resistance might be reduced and change management issues could be avoided.

Construction stage (configure and test) activities: In the model, activities related to “configure and testing” were presented together, based on Expert E’s suggestion, and were combined into a single “construction stage”. In the construction stage, configuration and testing activities were explored separately as discussed by different experts. Activities defined under the “configuration stage” include: comprehensive application configuration; system integration; data conversion; and data migration. Activities listed under the testing stage include: real data population in test instance; building test scripts and interfaces; writing and test reports; system (or regression) testing and user acceptance testing; and, finally, transition.

During the second week of discussion Expert F elaborated on the importance of system integration testing (SIT) and suggested that it should be completed before UAT. It was also suggested that SIT should be comprised of testing entire processes from start to end. This is different from individual unit, system and performance testing during the application development and configuration processes. Finally, UAT would be performed to obtain formal sign-off from the business/end users on the new functionality. Expert H provided insights based on practical ERP implementation experience and suggested that activities such as ‘real-time data in test instance’ were generally not performed. It was further added that a few integrated business cases should be tested on a prototype that would represent overall business operations and valid business processes.

Experts did provide valid points in accordance with their practical experience in midsize businesses. Consequently, activities such as application integration testing and prototype tests with integrated business cases within the capacity of regression/system testing were included. The activity “real-time data in test instance” was not changed but moved under regression/system integration testing.

‘Go live’ stage activities: Activities listed under “installation and go live stage” include: building of network (such as desktop installation); user training management; and system support activities. Other activities, listed earlier, include post-transition support to fix glitches and implementation standards.

Based on the second week of discussion, there were some changes made in the model. Firstly, the final stage was renamed as the “go live” stage and relevant activities were merged, such as building network and new infrastructure activities covering building network, desktop installation and so forth. Similarly, the post-transition support to fix glitches for the handling of issues would be in production environment.

In addition, Expert C indicated that due to resource constraints in midsize businesses, the user training requirements would be minimal and must be completed within the ‘go live’ stage. If extensive training is required then it should be completed during the earlier stages of implementation.

Training was considered as a key factor of ERP implementation. It is thus recommended to have knowledge transfer completed into two ways; firstly, ‘technical and functional staff’ training required for implementation tasks and secondly, ‘end user training’ required for user acceptance. Based on expert suggestions, both training types were specified throughout the model starting from ‘training activities for technical and functional staff’ in the setup sub-stage, followed by ‘plan and initiate end user training’ activity in re-engineering, ‘perform end user training’ in configuration and, finally, ‘complete end user training’ in the testing sub-stage of construction.

In addition, Expert F suggested including cut-over activities to stop further changes in the source system and complete relevant data migration activities, making the system production ready. Activities included loading all master and transactional data, any manual work to make the system ready, and verification of data validity upon final cut-over. These activities are critical; therefore, included in the updated version of the proposed model for further analysis.

Project closure and transition activities: Initially, the “project closure and transition” stage was not included the model. However, during the first week of discussion, some activities related to post-implementation were discussed. A number of researchers, such as Markus et al. (2000) and Parr et al. (2000) have also included post-implementation stages/activities in their proposed ERP models. In contrast, this research specifically focuses on ERP in midsize businesses and the relevant implementation processes only and not post-

implementation adoption. In the expert panel, a need for post-implementation activities was noted and Experts B, F, H, and M reaffirmed its importance for midsize businesses. For instance, Experts B, H and M suggested the inclusion of a “closure” stage to monitor and control project deliverables by mapping them against project requirements and by analysing business benefit realisation for improvement. In addition, it was suggested that an activity called “post-implementation review” should be included to analyse project success and document lessons learnt. In addition, Experts M and F suggested activities in the post-implementation stages, including shakedown and stabilisation; continuous improvement and enhancement; support procedure definition (by setting up priorities for problems/issues); approval mechanisms to handle post ‘go live’ issues; and formulation of post-‘go live’ training.

Based on the expert panel discussion, analysis and based on ERP implementation models (presented by Ross (1998), Esteves (1999), Markus and Tanis (2000) and Parr et al. (2000)), a **new** stage called “project closure and transition” was identified. The activities and processes included in this stage were: shakedown and stabilisation period; post-implementation review; system enhancement (including repairs and extensions); business process transformation; support procedure definition (setting priorities for issue resolution and approval mechanisms); and improvements/application upgrade activities.

5.4.8 Week two summary

In the second week of the Expert panel, the ERP implementation activities were presented for discussion. The purpose was to obtain expert feedback based on their experience and improve the list activities. The experts were requested to comment on the composition of activities, their sequence of appearance and also their relevance to the model. The activities were initially defined into six implementation stages, based on the literature analysis. The stages comprised: pre-planning, planning, setup and re-engineering, system design, configure and test, and installation ‘go live’ stage. Most of the comments received were relating to the sequence of activities, although some new activities were suggested. Below is the summary of activities discussed and changes made based on the expert panel discussion:

Based on the literature finding; the “pre-planning stage” activities included: ‘business case development’/ ‘project charter’, ‘decisions leading to financial approval’, ‘identify and manage key stakeholders’ and ‘formation of a steering committee’. The experts suggested moving ‘ERP application selection’ from the “planning stage to the pre-planning stage”, as the selection process starts before project inception. In addition, there were three **new** activities

suggested to be added into the “pre-planning stage”: ‘project scope determination’; as the scope of the project has to be identified at the beginning of project, ‘Identification of key business process’; for the purpose of business process mapping, and ‘higher level relationship building’.

Similarly, the planning stage activities presented for expert panel discussion and the feedback received contained comments to move, change, update or add another activity. For instance, in relation to ‘ERP application selection’ – the experts suggested moving this activity from planning to the pre-planning stage, the ‘project scope determination’ was repeated to finalise the scope, for ‘project team’ activity it was suggested to rename it as ‘project team setup’ and finally ‘resource determination’ remains unchanged. In addition to comments on existing activities, there were three **new** activities recommended for the “planning stage” including: ‘inter-team communication’; for an effective inter-team coordination, ‘implementation methodology’; for optimal project governance and control and ‘project plan development’ to draw critical project implementation details.

It was suggested by the experts to integrate three stages into a single build stage including: “set-up”, “reengineering”, and “system design”. The reason for this was that most of the activities defined in these sub-stages are inter-linked and should be completed in a sequential and integrated way. Furthermore, the experts did provide feedback on activities presented within Setup, Reengineering and System design sub-stages. For instance, in regards to Setup sub-stage, it was suggested to rename ‘team structure’ as ‘team structure identification’, ‘staff training’ as ‘technical and functional staff training’. ‘Team integration’ was accepted without change. In addition, two **new** activities were recommended in the setup stage including: project team selection containing a mix blind of people with different expertise level and reporting processes. Additionally, there were four activities presented for discussion within reengineering sub-stage including: ‘guiding principles’, ‘business process analysis’, ‘installation of ERP application’ and ‘business process mapping on ERP functions’. All these activities were accepted as valid and two **new** activities were recommended including: internal expectations management and plan and initiate end user training. Moreover, four activities were presented within System design sub-stage: ‘high level designing’, ‘additional details for user acceptance’, ‘interactive prototype’ and ‘user communication’. All these activities were accepted as valid for the system design stage.

Similar to the previous comments of integrating three sub-stages into a single Build stage, it was suggested to establish a Construction stage that should include activities relating to

configuration and testing. When experts were presented with the activities defined within configuration they suggested making some changes and also recommended some new activities. For instance, in response to 'comprehensive configuration' it was suggested to rename it as 'comprehensive software configuration' for the purpose of clarity. Furthermore, there were three configuration related activities suggested: 'system integrations', 'data conversion' and 'data migration', as well as two other activities including: 'perform end user training' and 'scope freeze' to mitigate the risk of scope creep. In addition to configuration stage activities, the testing activities were presented for discussion and experts provided their feedback. In response to 'build test interfaces' it was suggested to rename it as 'build test scripts and interfaces', for 'system testing' it was suggested to include regression testing as well renaming it as 'regression and system testing', for 'user testing' it was suggested to rename it as 'user acceptance testing (UAT)' and in response to 'user training' it was suggested to rename it as 'complete end user training'. Additionally, two other pre-identified activities: 'write and test reports' and 'real time data in test instance' remained unchanged. There were four **new** activities recommended for the testing stage: unit testing, prototype test with integrated business cases, application integration testing and performance testing.

When experts were presented the pre-identified Go live stage activities they suggested modifications along with recommending three **new** activities. In response to 'building network' it was suggested to rename it as 'building network and new infrastructure' and 'system support' was suggested to be renamed as 'post transition support to fix glitches'. Out of the two remaining pre-identified Go live activities, it was suggested to relocate 'user training' to construction stage and remove 'desktop installation'. The three **new** activities recommended for Go live stage were: loading of master and transactional data, any manual work to get system ready and data validity verification on final cutover.

For "project closure and transition stage" there were five **new** activities suggested for consideration. These were: shakedown and stabilisation period, post-implementation review, system enhancement (repairs, extensions, improvements and upgrades), business process transformation and support procedure definition (setting priorities for issue resolution and approval mechanism). Given the fact that the scope of this study is limited to the ERP implementation and factors analysis, the post implementation activities and factors are considered to be out of scope for this study. They are reported as recommendations made by experts but will not be further investigated for the purpose of this thesis.

Table 5.6 presents a summary of the changes made to the model based on the analysis above. As indicated earlier, the “project closure and transition” stage activities are only included in this table for *information only*.

Table 5.6: Updated ERP implementation stages and activities

ERP implementation stages and activities (Before review and analysis)	ERP implementation stages and activities (After review and analysis)
Pre-planning	Pre-planning stage
<ul style="list-style-type: none"> • Business case development/ project charter • Decisions leading to financial approval • Identification of key stakeholders • Formation of steering committee 	<ul style="list-style-type: none"> • Business case development/ project charter • Decisions leading to financial approval • Identify key stakeholders and manage • Formation of steering committee • Project scope determination • Identification of key business process • ERP application selection • Higher level relationship building
Planning	Planning Stage
<ul style="list-style-type: none"> • ERP Application Selection • Project Scope determination • Project Team Selection • Resource determination <p><i>Other activities listed at earlier stage include: Implementation methodology and project plan development</i></p>	<ul style="list-style-type: none"> • ERP Application Selection (moved up) • Project Scope determination • Project Team setup • Resource determination • Inter-team communication • Implementation methodology • Project plan development
Setup, reengineering and design	Build stage
<p>Setup</p> <ul style="list-style-type: none"> • Team structure and integration • Project team training <p><i>Other activities listed at earlier stage include: Project team selection; selecting mix blind of people with different expertise level, teams' integration, reporting processes.</i></p>	<ul style="list-style-type: none"> • Setup • Team structure identification • Technical and functional staff training • Team integration, • Project team selection (mix blind of people with different expertise level) • Reporting processes
<ul style="list-style-type: none"> • Reengineering • Guiding principles • Business process analysis • Installation of ERP application • Business process mapping on ERP functions 	<ul style="list-style-type: none"> • Reengineering • Guiding principles • Business process analysis • Installation of ERP application • Business process mapping on ERP functions • Internal expectations management • Plan and initiate end user training
<p>System design</p> <ul style="list-style-type: none"> • High level designing • Additional details for user acceptance • Interactive prototype • User communication 	<p>System design</p> <ul style="list-style-type: none"> • High level designing • Additional details for user acceptance • Interactive prototype • User communication
Configure and test	Construction stage
<ul style="list-style-type: none"> • Comprehensive configuration • Build test interfaces • Real time data in test instance • Write and test reports • System and user testing <p><i>Other activities listed at earlier stage include: Software configuration, system integration, data conversion/migration, real data population in test instance, building and testing interfaces, writing and testing reports, system and user testing and transition,</i></p>	<p>Configuration</p> <ul style="list-style-type: none"> • Comprehensive software configuration • System integrations • Data conversion • Data migration <p>Other Activities</p> <ul style="list-style-type: none"> • Perform end user training • Scope freeze <p>Testing</p> <ul style="list-style-type: none"> • Build test scripts and interfaces • Unit Testing

ERP implementation stages and activities (Before review and analysis)	ERP implementation stages and activities (After review and analysis)
	<ul style="list-style-type: none"> • Write and test reports • Regression, System Testing • Prototype test with integrated business cases • Real time data in test instance • Application integration testing • Performance testing • User acceptance testing (UAT) • Complete End User Training
Installation and 'go live'	'Go live' Stage
<ul style="list-style-type: none"> • Building Network • Desktop installation • User training • System support <p><i>Other activities listed at earlier stage include: Post transition support to fix glitches and implementation standards, Building networks and installation of desktops (if required), User training management.</i></p>	<ul style="list-style-type: none"> • Building Network and new infrastructure • Post transition support to fix glitches • Loading of master and transactional data, • Any manual work to get system ready • Data validity verification on final cutover
Later/Post installation	Project Closure and Transition
<p><i>Other activities listed at earlier stage include: System enhancement including repairs, extension, transformation, improvements and stabilisation phases.</i></p>	<ul style="list-style-type: none"> • Shakedown and stabilisation period • Post-implementation review • System enhancement (repairs, extensions, improvements and upgrades) • Business process transformation • Support procedure definition (setting priorities for issue resolution and approval mechanism)

The changes, alterations and new additions based on feedback provided by experts are identified in **red** text for reader convenience. The deletions are presented by 'strike-through' text.

5.4.9 Week three: Midsize business factors

Figure 5.7 provides an extract of the content discussed in the third week of discussion.

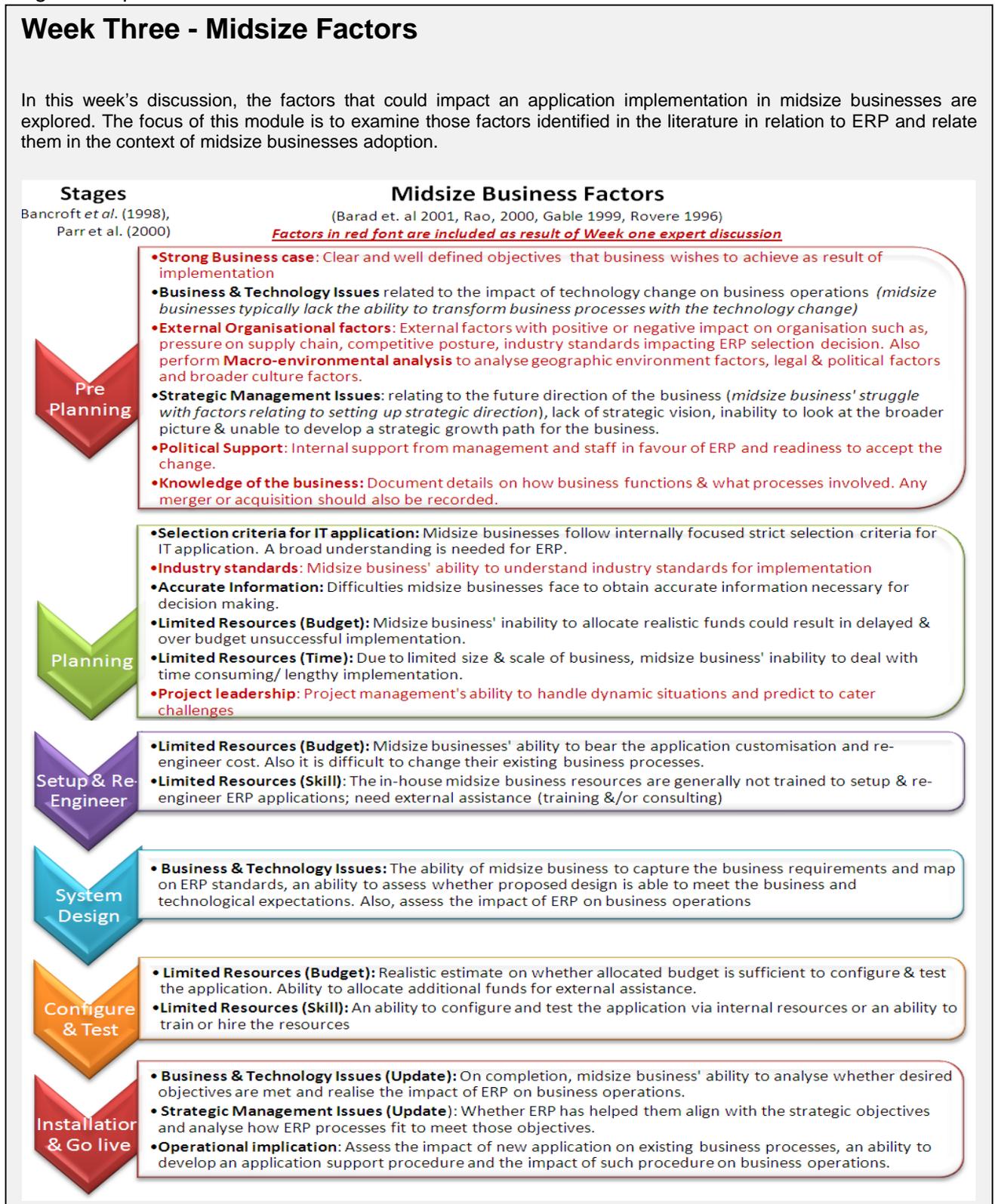


Figure 5.7: An abstract of the material presented in third week

In the first two weeks of discussion, the emphasis remained on ERP implementation activities but in the third week, the focus shifted to factors related to midsize businesses and their possible impact on ERP implementation.

5.4.10 Week three discussion

Experts B, C, D, E, H, J and M commented on the factors identified in the model and suggested ways to improve them. Altogether, the experts validated the composition of factors identified in the model but suggested modifications in their order of appearance. For instance, Expert M commented:

Your classification of midsize business issues in ERP implementation stages looks fine. The only thing you need to be careful of is recurrence of factors with impact broader than a single stage. (Expert M)

Expert D agreed with the comment about *recurring factors having broader impact on different stages* and suggested that some factors, such as lack of technical and human resource, were strongly related to his experience.

ERP selection decisions: Experts E, B, D and M suggested that ERP application selection decisions should be under the pre-planning stage, as these could have a huge impact on later implementation. In addition, Expert E and M argued that most midsize businesses would not have in-house expertise to make such strategic decisions. Generally, midsize businesses are less resilient to change and they lack information on new technologies. Therefore, they rely on information being fed to them by external/pre-sales consultants. This impact on their impartiality in the selection decision and also on the midsize business' ability to select a product that is more aligned with their business needs. Another relevant factor identified by Expert B was the locally available user and support base for the selected solution. As an external factor, environmental/compliance issues should also be considered, as in today's carbon control economy, this can really impact on the way a business operates (Expert B). Likewise, Expert M suggested that flexibility in the business mindset could be beneficial for ERP implementation, saying that:

(A) Flexible business model with willingness to change existing ways of business and an appropriate understanding of IT applications and technology could help enable midsize business to implement ERP effectively. (Expert M)

Limited resource (budget, time and skill) factors: Experts C, D, E, H and M analysed the resource factors considered crucial for ERP implementation in midsize businesses and acknowledged their practical significance in accordance with past experiences. Expert H suggested that limited resource (people and skills) should be separately presented from limited resource (budget). It was further added that in the midsize business a same person could be responsible for operational tasks as well as being a subject matter expert for the implementation team. Lack of resource (people/skill) could be a potential risk to project schedule and therefore, a significant level of planning is required to specify resource time allocated for the project and operational work. Expert D pointed out that lack of political and management support during project execution could be problematic, saying that:

You can plan it very well, you can hire additional staff to have support for existing processes and you can be very surprised not finding your key users on the training... why ? Because the CEO (in most such cases it is the same person who owns the company, or who even built it) has just decided that key users should do “something very urgent” (Expert D)

Expert J supported comments made by Expert H and alleged that resources (staff) should be employed full-time to carry out the project and spend a significant amount of time training, process mapping, and potential reengineering and testing the new system. In accordance with Expert J's experience, companies hire resources (consultants or temporary staff) to help keep the new system alive. In practice, it is more effective to hire additional staff to support legacy applications and use existing staff to focus on the new system (Expert J).

Expert D suggested adding a limited resource (skill) factor in the pre-planning stage, as it was common in midsize businesses for the IT team to have limited ERP implementation exposure. This would make the application selection and implementation preparation processes more difficult. Moreover, Expert M pointed out the significance of acquiring knowledge internally and its long-term benefits to application management. It was stated that the management of ERP applications would not stop at 'go live' but would be transformed into continuous improvement and enhancement phases. This could be another potential challenge for midsize business, due to not having skilled and dedicated resources to support the application, which could jeopardise the purpose of ERP implementation (Expert M).

Planning and requirement analysis: Expert E suggested developing a detailed project plan at an early stage of the project that must be communicated to all members of the team. This plan must be revised frequently to reflect updated changes. According to Expert C, most of

the deficiencies in the requirement gathering for ERP implementation have been due to simple/unclear details under generic operational procedures. Expert C further added:

ERP will have impact across all functional areas, plus add considerations that an SME may not have had before. Succession planning, knowledge management, inter-organisational systems, etc. (Expert C)

Similarly, Experts D and M explained the importance of business requirement analysis and the fact that it should be completed at an early stage of implementation. Expert M further argued that technical requirement analysis should help outline business drivers or the financial benefits that an ERP application could bring to the business. This would help develop a stronger business case, crucial for strategic management support. Due to their size and financial constraints, midsize businesses are generally unable to allocate the substantial amount of funds necessary for ERP implementation. This could cause scalability issues to match the application deliverables with business expectations (Expert M).

5.4.11 Week three analysis

In the third week of discussion, the focus was on factors relating to midsize business and their relevance to ERP implementation. A list of factors was provided for discussion including those identified from the literature along with factors specified by experts during the first week of discussion. The reason for combining the list was to present all identified issues in a sequential way and to establish a discussion to improve or validate their relevance within the model.

In response, experts provided comments related to stages of implementation and the sequence of the factors identified in each stage. Below is the analysis of comments made by experts and the resultant outcome in relation to the proposed model.

Pre-planning stage: In the Initial iteration of the model, there were only two factors identified in pre-planning stage (i.e. business and technology issues, and strategic management Issues). These factors covered a broad base of sub-factors relating to business functionality, the impact of technology on business functions and the ability of a business to have a strategic focus on growth and expansion. During the first week of the expert panel, a general discussion on the model was conducted and some **new** factors were identified by the experts under the pre-planning stage. These were *strong business case development*, *external organisational factors*, *macro environmental factors*, *political support within the organisation*, and *business knowledge documentation*.

In the third week of the expert panel discussion, the factors discussed by experts were endorsed and the significance of the ERP application selection process was apparent with the likely impact on midsize business. Therefore, the following factors were included within the pre-planning stage of the revised model: limited resources (skills); technical requirements analysis; knowledge of the business; development of strong business case; external organisational factors; macro environmental factors; business and technology Issues; strategic management Issues; and political support of ERP implementation.

Planning stage: Initially there were only three factors identified under the planning stage of the model. These factors were 'criteria for selecting information system', 'accurate information availability for decision making', and 'limited resource constraints' such as time and budget. Later, during the first week of general discussion, some other factors to be included under planning stage were suggested by experts. These factors were cultural (local and on national level), government or regularity change, industry standards, and project leadership issues related to risk and issues management.

During the third week, Experts B, E, H and M suggested that some other factors be included. These factors were considered relevant to the topic and some had a significant impact on the ERP implementation selection process during the planning stage. Consequently, the following factors were included in the revised iteration of the proposed model: limited resources (people); effective time management for resource scheduling; the availability of accurate and relevant information about ERP applications; the development of selection criteria with relevant parameters in accordance with business expectations; less reliance on sales advice; the availability of a user and support base for a selected ERP application; detailed project plan development with an effective communication strategy; and external environmental factors.

Build stage (setup, reengineering and system design): In the initial model, under the setup, re-engineering and system design stage (build stage), two types of factors were identified: limited resources (budget and skill); and business technology factors. As indicated earlier, both of these factors have a broader base starting from business operability, resource constraints and technology impacts on business functions. Experts suggested that some other factors should be considered in these sub-stages of ERP implementation, such as situational leadership issues and issues resulting from mergers or acquisitions. As a result of the first week of discussion, three relevant stages (i.e. setup, reengineering and system design) were merged to form the "build stage".

During the third week of discussion, Expert J argued that given the resource constraints of midsize business, the impact of staff hiring and placement strategies becomes prominent in the build stage. Comments provided by Expert J were considered to be valid and practical and, therefore, limited resources (people/skill) were included under the build stage in the revised model.

Construction stage (configure and test): In the initial model, limited resources (budget and skill) were presented as the only major factor under the “configure and test” stages. After the first week of high level discussion, some additional factors were included in the construction stage, based on expert recommendations. These factors related to ‘scope creep’ or redefined scope, time and resources as a result of potential mergers and/or acquisitions of midsize businesses. The entire re-scoping effort could have a significant impact on project scope, resources and expected deliverables.

In the third week of discussion, Experts M and D suggested considering the recurrence of factors with an impact broader than a single stage. According to Expert D, extensive planning would be the key for effective management of a project and to reduce negative factor impact. Due to limited resource structure, a project team could face challenge of direct intervention from the business senior team, disrupting the project work and allocating key users on operational work.

To cater for the challenges of recurring factors or factors with broader impact, these are included in the model stages several times based on their relevance. It is also important to be specific while discussing the impact of a factor rather than generalising about its broad implications. Extensive planning could be considered as extremely important, however, to avoid direct interventions from senior business management; it would be beneficial to have sufficient project resources if business resources were taken off from the project. Based on the expert comments, two **new** factors were included within the construction stage: ‘cross-dimensional factor impact’ under the build and testing stages; and ‘dedicated resources (people/skill)’ under the testing sub-stage of the construction stage.

‘Go live’ stage: In the initial model, two factors were listed under the installation and ‘go live’ stage; business and technology factors (updated); and strategic management factors (updated). The reason for the updates was to capture the knowledge base recorded during the earlier execution in the stages and provide lessons learnt. In addition, during the week one discussion, experts suggested the consideration of operational implications under the ‘go live’ stage for further discussion.

During the third week, all relevant factors were included in the model and presented to the experts for discussion. As a result, Expert C argued that most of the noticeable weaknesses in implementation were due to lack of detail under the operational implication factor. In addition, Experts C and M indicated that ERP has impact across all functional areas and therefore, succession planning, knowledge management and its acquisition for effective management of the application and inter-organisational systems should also be considered. Furthermore Expert M stated that implementation process did not stop at go live but re-formed into continuous improvement and enhancement phases. Special consideration should be made for midsize business, as they would not be exposed to such an intense change of processes. Without dedicated technical and functional resources to maintain and manage ERP applications the entire ambition of ERP implementation might not reap the desired benefits.

From the discussion, it seems experts attempted to elaborate on the operational implication factor and outlined the benefits and reasoning behind their inclusion in the first week of discussion. After analysing the expert comments, some factors were considered for inclusion within the 'go live' stage. These were: ERP business functional impact; succession planning; knowledge management for ERP maintenance and support; and effectiveness of inter-organisational system integration.

5.4.12 Week three summary

In the third week of the expert panel, the emphasis was on midsize business factors and their likely impact on the ERP implementation. The discussion evolved from the first week when experts started to outline midsize business specific factors when high level information was presented. Consequently, in the third week, factors identified from the literature along with suggestions made in the first week were presented in an integrated way to avoid repetition and conduct a detailed discussion of the expert comments. As a result, the experts discussed the presented factors in a staged approach. Some of the key discussion points included: a need for an early selection decision on ERP application, the limited resources availability for midsize and detailed planning for ERP project.

In response to the midsize business factors presented, the experts provided feedback to change, add or delete them.

Table 5.7 provides a combined view of the midsize business factors from the initial iteration (refer Table 5.5), the revised presentation after the first week and the encapsulated view at

the end of the third week of discussion. Please note, the additions and changes are identified in red text for readability. There were no deletions.

Table 5.7: Updated midsize business factors

Midsize business factors (Before review and analysis)	Midsize business factors (After first week review)	Midsize business factors (Post review and analysis)
Pre-planning		Pre-planning stage
<ul style="list-style-type: none"> Business and technology issues; Strategic management issues; 	<ul style="list-style-type: none"> Strong business case External organisational factors Macro environmental factors Business and technology Issues; Strategic management issues; Political support Knowledge of the business 	<ul style="list-style-type: none"> Strong business case External organisational factors Macro environmental factors Business and technology issues; Strategic management issues; Political support Knowledge of the business Limited resources (skills) Technical requirements analysis
Planning		Planning stage
<ul style="list-style-type: none"> Criteria of selecting an Info system; Accurate information; Limited resources (time, budget); 	<ul style="list-style-type: none"> Cultural factors (local, national) Government or regularity change Industry standards Criteria of selecting an Info system; Accurate information; Limited resources (time, budget); Project leadership (risk and issues) 	<ul style="list-style-type: none"> Cultural factors (local, national) Government or regularity change Industry standards Develop selection criteria with relevant parameters per business needs Availability of accurate and relevant information on ERP applications, Limited resources (Budget) Effective time management Project leadership (risk and issues) User and support base for application Less reliance on sales advice, External environmental factors Detailed project plan with an effective communication strategy Limited resources (people/skill)
Setup, Reengineering and design		Build stage
<ul style="list-style-type: none"> Limited Resources (Budget, Skill); Business and Technology Issues; 	<ul style="list-style-type: none"> Limited Resources (Budget) Limited Resources (Skill); Situational Leadership issues Issues due to Mergers/ Acquisitions Business and Technology Issues; 	<ul style="list-style-type: none"> Limited Resources (Budget) Limited Resources (People/Skill) <ul style="list-style-type: none"> **Trained business staff **Professional external consultants **Temporary staff to backfill existing business staff Situational Leadership issues Issues due to Mergers/ Acquisitions Business and Technology Issues Cross dimensional factor impact
Configure and test		Construction stage
<ul style="list-style-type: none"> Limited resources (budget, skill); 	<ul style="list-style-type: none"> Limited resources (budget) Limited resources (skill); Issues due to mergers/ acquisitions 	Configure <ul style="list-style-type: none"> Limited resources (budget) Limited resources (skill); Issues due to mergers/ acquisitions

Midsize business factors (Before review and analysis)	Midsize business factors (After first week review)	Midsize business factors (Post review and analysis)
		Testing <ul style="list-style-type: none"> • Limited resources (budget) • Cross dimensional factor impact • Dedicated resources (people/skill) • Issues due to mergers/ acquisitions
Installation and 'go live'		'Go live' Stage
<ul style="list-style-type: none"> • Business and Technology Issues (Update); • Strategic Management Issues (Update); 	<ul style="list-style-type: none"> • Business and Technology Issues (Update); • Strategic Management Issues (Update); • Operational implication 	<ul style="list-style-type: none"> • Business and Technology Issues (Update); • Strategic Management Issues (Update); • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ <i>ERP business functional impact</i> ○ <i>Succession planning</i> ○ <i>Knowledge management for ERP maintenance/support</i> ○ <i>Effectiveness of inter-organisational system integration</i>

5.4.13 Week four: Technical factors

Figure 5.8 provides an extract of the content discussed in the fourth week of discussion.

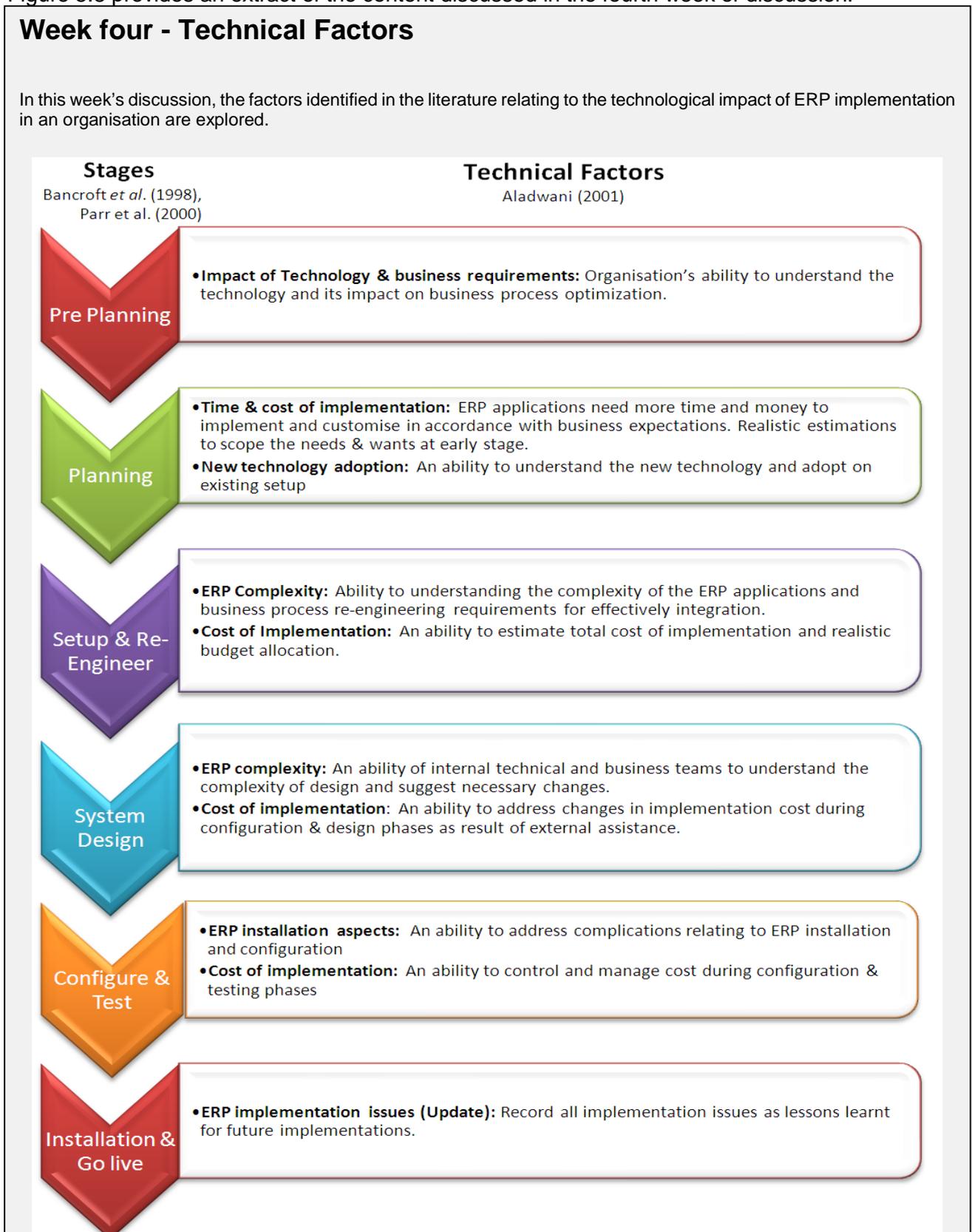


Figure 5.8: An abstract of the material presented in the fourth week 188 | Page

5.4.14 Week four discussion

During the fourth week of the expert panel, technical factors with a possible impact on midsize business implementation of ERP were discussed. Comments made by Experts B, C, D, E, F, and M related to technical issues and suggested remedies for effective management. For instance, Experts C, F and M provided comments on different ERP application compatibility issues and the development of adaptive environments that should assist organisations in adopting new technologies. Other comments made by Experts E, F, B, D and M related to data migration and issues related to data consistency and rectification. The following provides a summary of discussions.

Application compatibility: According to Experts C and F, application compatibility could be a major issue and could emerge while integrating with existing midsize business applications or applications used for data exchange with external parties (clients, customers or suppliers). In addition, Expert F stated that sometimes organisations are unable to understand the complexities of either replacing their existing applications or integration processes or identifying an effective way to integrate different systems with ERP application. Moreover, Expert C indicated that:

Though this may be intended in some of the terms included in the various stages, there does not seem to be such consideration of external compatibility at all. This should be an element in every stage, though it could be added as an item under an existing heading. (Expert C)

In accordance with the above comment, application compatibility should be considered as a technical factor and included in every stage of implementation. Expert B specified integration with other smaller systems as an important element of ERP implementation, stating:

Despite the ERP being the main system, in our region it is common to find several bespoke, single user systems that are part of the bigger picture and often tend to get ignored. (Expert B)

Similarly, identification of consultant's expertise was considered to be another important factor (Expert B). Over-customisation was also considered as a matter of concern and Expert B suggested that there is a tendency to "give in" to user demands. This could result in hidden costs in future upgrades and maintenance and, therefore companies should restrict

themselves to minimal customisations (Expert B). The amount of customisation required for an implementation should be identified in the planning and system design stages.

Development of an adaptive environment: Midsize businesses should greatly emphasise the identification of the business value that an ERP application could bring. This process should be completed as part of the planning exercise, followed by setup and design strategy development for adoption of the new system. This should create an adaptable environment to support midsize business adoption of new technologies and to resolve policy and physical constraints during the implementation/ configuration stages. As Expert M noted:

From my experience, pre-planning that includes understanding the new system and its value for the organisation is quite important. It is the basis of the migration in the first place. (Expert M)

Data migration issues: According to Experts E, F B and D, data migration should be considered as one of the most important technical issues faced in the ERP implementation. In addition, Experts E and D commented on the inappropriate tendency to “keep data migration to the end”. According to Expert D, data migration should be planned and clearly communicated, especially in the case of midsize businesses that have extensive amounts of bad quality data. As data consistency is very important for ERP implementation, bad quality data could create potential risks and data cleansing issues cannot be resolved overnight. Expert D commented that:

If this is the first ERP in the company you need to migrate data from many different sources (including Excel sheets) (Expert D).

In addition, Expert E indicated that if an appropriate amount of data cleansing is not performed before uploading the data into the new system, this could raise major issues. This might also impact on the configuration of a new system and, if not corrected completely, it could create serious problems for the application (Expert E). Furthermore, companies implementing ERP applications have to deal with many technical complications. This requires an active transmission and sharing of data with other vendors (suppliers or customers). Expert E further added:

I would suggest that it is better to analyse the complete system architecture in detail and they should have a preliminary plan to resolve any issue that may arise. (Expert E)

5.4.15 Week four analysis

In the fourth week of discussion, comments were made related to technical issues in the real-time environment while implementing ERP applications. Experts C, F and M commented on standard IT application compatibility issues with ERP and suggested the development of an adaptive environment that should assist organisations in adopting new technologies. Other comments related to data migration and issues with data consistency and rectification.

Related factors were presented in the ERP implementation stages sequence (i.e. pre-planning; planning; build (setup, re-engineering and system design); construction (configuration and testing); and 'go live'). Below is the analysis of the expert comments and their impact on the proposed ERP adoption model.

Pre-planning stage: In the initial iteration of the model, there was no technical factor identified under the pre-planning stage. During the first week of discussion, it was suggested that business requirement analysis and the impact of technology on the business should be considered before the planning stage. Therefore, a **new** factor called 'impact of technology and business requirements' was included under the pre-planning stage.

During the fourth week of discussion, Expert M highlighted the significance of the pre-planning stage and indicated that an understanding of a new system and its value for the business must be clarified. This information should be used as a foundation for the migration of the application from existing to a new ERP system.

An optimal level of technical requirement definition and translation of business needs into technical solutions is vital. Without a clear understanding of business expectations from technology solutions, selecting any IT application could cause frustration during and after implementation. Therefore, two **new** factors were included within pre-planning stage: technical requirements identification; and understanding of the application and usefulness. The factor 'impact of technology and business requirements' was divided into two factors in the revised model: 'business requirement identification'; and 'impact of technology'.

Planning stage: Initially, "time and cost of implementation" was the only factor identified as a technology-related factor under the planning stage. After the first week of discussion, some experts suggested new technology adoption and industry standards as additional technical factors in the planning stage. As ERP applications have always been sophisticated and

standards-oriented, detailed information on their adoptability and standards needed to be accumulated and adhered to during implementation.

During the fourth week of discussion, experts outlined the technical complications faced by organisations while implementing ERP systems. These technical complications related to integration requirements with other vendor applications or the sharing or sending of data. It was suggested by Expert F that a complete system architecture analysis should be performed in detail and any significant technical matters should be raised in the preliminary plan. Furthermore, Expert B raised concerns in regards to consultant expertise relating to relevant applications. It was also indicated that realistic user expectations must be established at an early stage as “giving in” to users might result in application customisation and increased costs. The comments provided by the experts were relevant and have significant importance in terms of technical solutions selection for midsize business. Consequently, all of their points were considered in the planning stage and, as such, four new technical factors were included. These factors were: system architecture analysis of application; technical staff/consultant expertise; user expectation analysis with an objective to having minimal or no customisations; and the identification of the value stream for the organisation.

Build stage (setup, reengineering and system design): In the initial model, three stages were defined within the build stage: setup, reengineering and system design. Following the first week of general discussion, a single “build stage” was introduced comprising three sub-stages, as recommended by an expert. In the initial model three types of factors were repeated in each stage: ERP complexity; in-house expertise; and cost of implementation. During the fourth week, these activities were listed under the single build stage for discussion. Experts C, F and M provided comments related to the build stage (and its sub-stages), centred around technical factors. The primary focus of their comments related to compatibility issues within ERP implementation along with the formulation of a strategy for setup and designing a new system for business. It was argued that compatibility issues could relate to existing applications in use or of data exchange with external clients. Experts C and F suggested that external compatibility should be a key factor in each implementation stage and issues related to compatibility must be identified and addressed appropriately. It was also indicated that a normal business could not envisage the complexities of replacing a business application with ERP or the integration and technicalities requirements of ERP with other business applications being used.

Due to the relevance of the technical factors discussed by experts and their significance, ERP compatibility issues with other applications and the development of a system design strategy were included in the model for further analysis.

Construction stage (configure and test): In the initial model, configure and test stages were presented together, including activities such as ERP installation aspects, in-house expertise and cost of implementation. After the first week general discussion, the “configure and test stages” were combined under a single “construction stage”, whilst maintaining configuration and testing as sub-stages.

During the fourth week of discussion, experts provided comments related to data migration and application integration. It was suggested that data migration should be appropriately planned and clearly communicated, especially in the case of midsize businesses where data quality could be poor. It was further indicated that during the first ERP implementation, data needed to be migrated from server sources including Excel spreadsheets and therefore, appropriate planning would be crucial. Expert B also touched on aspects related to application integration with smaller systems, especially when several single user systems are combined to support business operations.

After analysis, data migration and application integration factors were included in the revised model for further in-depth analysis. Earlier in the chapter two, it was discussed that Rosa et al. (2012) proposed an implementation estimation strategy that highlighted the significance of data conversion and did consider it important for the successful implementation. Given the critical nature of data migration, some additional steps were also included to broaden its scope (i.e. early development of data migration strategy, strategy communication, and data quality analysis and cleansing).

‘Go live’ Stage: In the initial model, under installation and ‘go live’ stage activities, there was only one activity defined (i.e. ERP implementation issues (updated)). This covered the documentation of lessons learnt during the implementation and the updating of technical issues. During the fourth week of discussion, no additional comments were made by experts relating to the installation and ‘go live’ activities. Therefore, only one predefined factor was listed under installation and ‘go live’ stage.

5.4.16 Week four summary

The purpose of the fourth week discussion was to analysis technical factors with reference to their impact on midsize business ERP implementation. Some of the key components discussed in the fourth week included; application compatibility issues with potential internal and external application integration dependencies from ERP application, the identification of business value due to ERP application developing an adaptive environment and also the data migration related challenges. In the fourth week, experts were presented technical factors identified from literature as well as those suggested by experts in the first week.

Table 5.8 provides a combined view of the technical factors from the initial iteration (Refer table 5.5) and a revised presentation after including factors from the first week discussion. Finally, an encapsulated view of technical factors is provided based on fourth week discussion. The additions and changes are identified in red text for easy readability and identification. No factors were deleted.

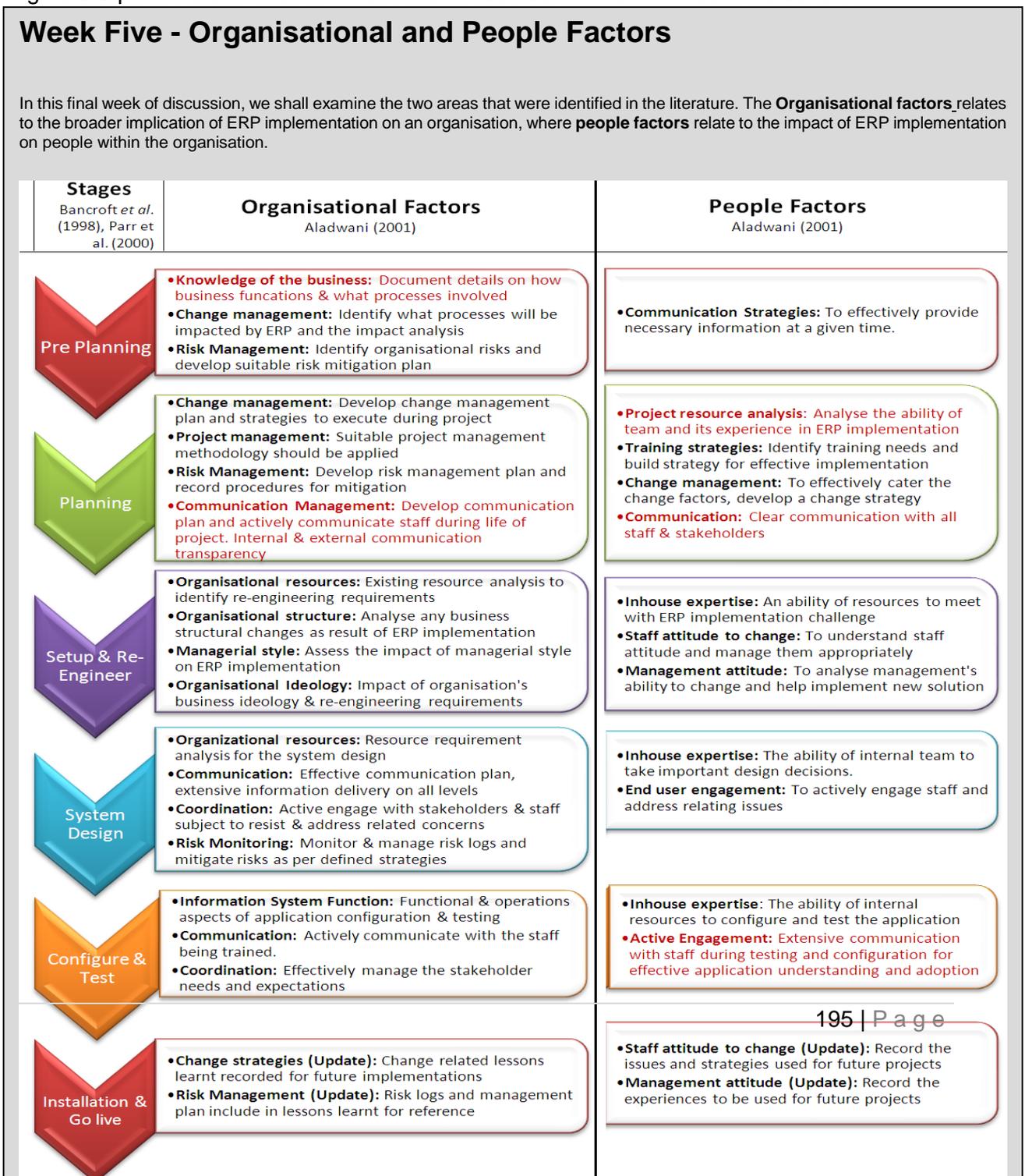
Table 5.8: Updated technical factors

Technical factors (Before review and analysis)	Technical factors (After first week review)	Technical factors (Post review and analysis)
Pre-planning		Pre-planning stage
	<ul style="list-style-type: none"> Impact of technology and business requirements 	<ul style="list-style-type: none"> Business requirements identification Technical requirements identification Application understanding and usefulness Impact of technology
Planning		Planning stage
<ul style="list-style-type: none"> Time and cost of implementation 	<ul style="list-style-type: none"> Time and Cost of implementation New technology adoption * Industry standards; 	<ul style="list-style-type: none"> Time and cost of implementation New technology adoption issues Industry standards Proposed application system architecture analysis Technical staff/consultant expertise Realistic end user expectation analysis (Minimal or no customisations) Identify value stream for organisation
Setup, Reengineering and Design		Build stage
<ul style="list-style-type: none"> ERP complexity; In house expertise; Cost of implementation ERP installation aspects; In house expertise; * Cost of implementation 	<ul style="list-style-type: none"> ERP complexity; Cost of implementation * In house expertise; 	<ul style="list-style-type: none"> ERP complexity; Cost of implementation In house expertise; ERP compatibility issues with other applications Develop a system design strategy
Configure and test		Construction stage

<ul style="list-style-type: none"> ERP installation aspects; In house expertise; Cost of implementation 	<ul style="list-style-type: none"> ERP installation aspects; Cost of implementation 	<ul style="list-style-type: none"> ERP installation aspects; Cost of implementation Data migration <ul style="list-style-type: none"> Early development of strategy Strategy Communication Data quality analysis and data cleansing Application integration <ul style="list-style-type: none"> Identify systems for integration
Installation and 'go live'		'Go live' Stage
<ul style="list-style-type: none"> ERP implementation issues (Update); 	<ul style="list-style-type: none"> ERP implementation issues (Update); 	<ul style="list-style-type: none"> ERP implementation issues (Update);

5.4.17 Week five: Organisational and people factors

Figure 5.9 provides an extract of the content discussed in the fifth week of discussion.



In the fifth and final week of the expert panel, the discussion focus was directed towards the organisational and people factors relating to ERP implementation. The experts were requested to provide comments of relevance to midsize business and suggest any additional factors that should be considered.

5.4.18 Week five discussion

During the fifth and final week of the expert panel, organisational and people factors related to ERP implementation were discussed. Experts B, C, D, E, F, H, and M provided comments on factors presented in the model under the banner of organisational and people factors. On the whole, the experts agreed that the factors identified in the model are relevant and cover most of the midsize business-related aspects. Comments included:

The factors as they would relate to an SME are well covered here. (Expert E)

The factors are relevant; however there are some key things to be considered, especially in our region (Expert B)

Comments are presented below under the relevant headings.

Organisational factors: According to Expert M, ERP projects are different to standard ICT projects, with broader functional and technical implications. An ERP project impacts on thousands of organisational business processes and, therefore, cross organisational business factors must be considered. A midsize business sometimes acts as a subsidiary or a partner of a large corporation and implementation of an ERP application could significantly impact on their operations and business activities (Expert M). Expert B highlighted the significance of lessons learnt and questioned the organisational culture to deal with implementation mistakes, saying:

Does the organisation deal with mistakes? Is there a blame culture? (Expert B)

Similarly, Experts E and D identified change management as one of the most important factors and suggested that this be included in the entire project. As Expert E made explicit:

Change management is by far the most important factor and should be included at all stages. (Expert E)

Expert F suggested some additional factors that should be included in the model, such as: the level of commitment shown by the executive management (leadership involvement); the significance of business impact analysis to analyse the impact of ERP on organisational business processes; and measuring the expected benefits at organisational and individual levels. In addition, Expert M stated that an ERP application must be able to provide completeness after project closure and should be able to facilitate rapidly changing organisational business requirements. This is important for midsize businesses that grow at a faster pace (Expert M)

People factors: Experts C, H, B, F, D, M suggested a number of points that should be considered. Below is the list of factors discussed by these experts:

1. Team building: Experts C, B and H highlighted the importance of team building and outlined the activities that would be crucial to unify the team. Experts C and H indicated that team building processes should be completed in the early stage of the project (i.e. in planning) and should be supported by effective team management and control during the rest of the stages. Expert C further suggested,

This (team building) can fall under project management activities for the organisation and/or be a new category in planning under the people side. (Expert C)

Expert B argued that a team should be formed based on staff competence, not on the basis of their relationships with management (i.e. handpicked). It is also important to ensure that the project team has the confidence of end users and they must take ownership of their work (Expert B).

2. Conflict resolution: Expert C indicated that conflict resolution is one of the critical factors in ERP implementation and that a viable conflict resolution strategy should be developed in the pre-planning or planning stages. Furthermore, Expert B questioned the potential management of disagreements in the team and suggested that they should be handled professionally, not personally by team members.
3. Staff incentives strategy: To facilitate the good work of project team members, Experts B and H suggested the development of a staff incentive strategy, so that results could be achieved in a more productive way. Upon successful completion of the project, incentives/bonuses should be provided to the staff who effectively participated in the project. There should also be a staff appraisal method to analyse staff performance and productivity.

4. Effective communication strategy: According to Expert M, an awareness of the implementation of ERP at an organisational level is important for the success and adoption of the new application. An effective communication plan helps manage change issues impacting on the way people do business. Key users should always be involved, especially during the test and 'go live' stages of the implementation (Expert D). In addition, Expert F indicated that a communication plan must identify,

“Who, what, when and how communication will be made in the project” (Expert F)

Furthermore, it was suggested by Expert F that a method to measure the effectiveness of communication throughout the project should be established, with a survey suggested as an optimal method of measurement.

5. Stakeholder management: Due to diverse configuration requirements, effective stakeholder management is also crucial for an ERP project. The requirements are generally made by stakeholder groups (internal or external) and if integrated into the project scope, could potentially increase cost and expectation/change management issues (Expert M).

5.4.19 Week five analysis

In the fifth and final week of discussion, two different types of factor domains (organisational and people) were analysed with reference to small and midsize businesses. It was concluded from the research literature that, in most cases, small and midsize businesses have limited dedicated staff for multiple organisational functions. Therefore, organisational and people factors were co-related and thus discussed together.

The analysis performed on the comments does not follow the pattern of discussion but it is structured in accordance with the model presentation of activities in the five ERP implementation stages. Comments are discussed under relevant stage headings with organisational and people factors discussed separately.

Pre-planning stage:

Organisational factors: In the initial model, there were only two organisational factors identified in the pre-planning stage of implementation: change management and risk management. During the first week of discussion, experts provided some additional factors that were also incorporated under the pre-planning stage, such as extra organisational factors, organisational knowledge and political support for ERP. While establishing the

discussion for the fifth week, all of these factors were presented under the pre-planning stage. One expert (M) suggested that consideration should be given to cross-organisational business functions and the possible implications of introducing ERP to automate these processes. However, the question would be: when should cross-organisational business functions be considered? According to Expert M, an early consideration should be made and therefore, this factor is included within the pre-planning stage for further case study analysis.

People factors: In the initial model, there was only one factor identified under the pre-planning stage for people factors: communication strategies. During the fifth week of discussion, Experts B and C highlighted a need for conflict resolution mechanisms. It was further argued that a conflict resolution procedure should be developed in the pre-planning or planning stage if team engagement is required. This should be considered as part of a team building exercise within the project team development activities.

As 'project team setup and development' was defined the planning stage, based on expert comments, conflict resolution factor is now introduced in pre-planning stage of people domain. The reason behind introducing 'conflict resolution procedure' in the pre-planning stage is to establish an effective and proactive people management plan for ERP implementation.

Planning stage:

Organisational factors: In the initial model, there were two factors identified under the planning stage of implementation for organisational factors: change management and project management. During the first week of discussion, other factors were suggested by experts and were included in the model. These were: risk planning and monitoring, effective communication and clear/well-defined objectives. All of these factors were presented during the fifth week of discussion. In response, experts provided suggestions related to predefined factors and also discussed their practical implications. For example, Expert Ds and E indicated that organisational change management is a gradual process and therefore, should be included in all stages of implementation.

As a result of the experts input, the following new factors were included in the model: organisational change management (in every stage); executive management commitment; business impact analysis; definitions of individual and collective benefit measuring; communication strategy based on a "who, what, when and how" method; and

techniques to measure the success of communication (survey). These factors would be further tested and assessed in the next stage of research analysis.

People factors: In the initial model, there were two factors defined under people strategies: training strategies development and change management. During the first week of discussion, two more factors were suggested by the experts: team competence and clarity in communication. All four factors were included in the model and presented to the experts during the fifth week of discussion. In response, Experts B, C and H discussed factors and provided guidance for improvements. For example, according to experts, “team building” is the first factor that should be considered in the planning stage and there should be a mechanism for selecting team members. All activities related to team building should be completed in the early stages of the project and should come under project management/planning activities. In addition, Experts B and H suggested considering incentives to be defined against deliverables throughout the project.

In the ERP implementation activities, team formation and development related activities are defined under the planning stage. Some of the new factors included in the model as a result of the fifth week’s discussion include team building and incentives for deliverables.

Build stage (setup, reengineering and system design):

Organisational factors: In the initial model, there were a number of organisational factors listed under the build stage: organisational resources; organisational structure; managerial style; organisational ideology; effective coordination and risk monitoring. During the first week of discussion, some of the experts suggested adding new factors under the build stage, such as project monitoring and control, change management and effective communication. All of these factors were presented in the model during the fifth week for discussion. As a result, Experts D and M provided some comments and suggestions for improvement. For instance, Expert D highlighted the need to include organisational change management throughout the project. Expert M’s comments were related to stakeholder expectation management.

After analysing the comments made by experts, two factors were included in the revised version of the model: organisational change management and stakeholder expectation management.

People factors: In the initial model there were only two people factors included under the build stage (and its sub-stages): staff attitude to change and management attitude. During the first week of discussion, experts suggested the inclusion of three more factors: in-house expertise; clarity in communication; and internal and external team management. All of these factors were presented for discussion during the fifth week of discussion. In response, Experts B and H provided comments and suggestions for improvement. After analysing the suggestions provided by experts, these factors were included in the revised model: team management; and control and business support for the UAT team.

Construction stage (configure and test):

Organisational factors: In the initial model, there were two organisational factors defined under the construction stage (and sub-stages): information system function and effective communication and coordination. After the first week of discussion, based on expert comments, two other factors were included in the model: project monitoring and control and organisational change management. All of these factors were presented for discussion. In response, only Expert D restated the need to include change management in each stage of implementation. As there were no additional comments made related to organisational factors in this stage, the structure of existing factors remained the same.

People factors: In the initial model, the only people factor included under the construction stage was staff involvement. Later, during the first week of discussion, three other factors were also included: in-house expertise; communication strategies; and internal and external team engagement. All of these factors were presented to the experts for discussion. In response, only Expert D suggested a change - to include engagement of all key users in the testing stages of implementation and during 'go live'.

As business input is required to sign-off on UAT and functional testing of the application, it is imperative to include all types of users during the final testing and 'go live' stages. Therefore, key user involvement in the testing and 'go live' stages has been included in the revised model.

'Go live' stage:

Organisational factors: In the initial model, there were two organisational factors included under the 'go live' stage: change strategies (updated); and risk management (updated). The updates generally are the extracted of the lessons learnt at the end of a project. These recorded lessons are useful while planning for another project. After the

first week of discussion, other three factors were included: 'effective communication'; 'project monitoring and control' and 'change management'. All of these factors were presented for discussion in the fifth week. In response, Experts B, D and M provided some comments and suggestions for improvement. For instance, Expert D reiterated the need to include change management in each stage of implementation and Expert B highlighted a need for a methodology to record mistakes and to avoid a 'blame culture'. According to Expert M, the ERP application must have the capacity to cope with the rapidly changing organisational and growth requirements of midsize businesses.

In relation to the comments provided by experts, organisational change management is already included in the model and the comments made by Expert M regarding the ability of ERP to cope with change are not included, as these comments are related to the project outcome.

People factors: In the initial model, there were two people factors included in the 'go live' stage: staff attitude to change (updated) and management attitude to change (updated). Both of these factors relate to lessons learnt, recording the updated experience at the end of the project. After the first week of discussion, another people factor was included - end user engagement. However, there were no specific comments from the expert panel related to people factors in the 'go live' stage. Therefore, the structure of factors remained the same.

5.4.20 Week Five summary

In the fifth and final week of the expert panel, it was decided to present the organisational and people factors together. It was a convenience decision to ensure that the experts would be able to provide feedback in the final week before the expert panel engagement finished. The discussion was conducted by analysing both organisational and people domain factors with reference to ERP implementation in midsize businesses.

Organisational factors:

Some of the key factors in relation to organisational domain were discussed. Experts argued that ERP projects are different from ICT projects with broader implication on an organisation. The impact of an ERP application could be over thousands of business processes being used, hence cross organisational business functions should be considered. Table 5.9 provides a

combined view of the organisational factors from initial model iteration (refer Table 5.5) and revised presentation after including the first week suggestions.

Table 5.9: Updated organisational factors

Organisational factors (Before review and analysis)	Organisational factors (After first week review)	Organisational factors (Post review and analysis)
Pre-planning		Pre-planning stage
<ul style="list-style-type: none"> • Change strategies development; • Risk management; 	<ul style="list-style-type: none"> • Change strategies development; • Risk management; • External organisational factors • Organisational knowledge • * Political support 	<ul style="list-style-type: none"> • Change management; • Risk management; • External organisational factors • Organisational knowledge • Political support • * Cross organisational business functions
Planning		Planning stage
<ul style="list-style-type: none"> • Change strategies development; • Project management; • Risk management; 	<ul style="list-style-type: none"> • Change strategies development; • Project management; • Risk planning and monitoring; • Effective communication • Clear and well defined objectives 	<ul style="list-style-type: none"> • Organisational change management • Project management; • Risk Planning and monitoring; • Effective communication strategy, based on "who, what, when and how" • Clear and well defined objectives • Define individual and collective benefit • Executive management commitment • Business impact analysis, • * Effectiveness techniques for communication (survey)
Setup, reengineering and design		Build stage
<ul style="list-style-type: none"> • Organisational resources, • Organisational structure; • Managerial style; • Organisational ideology; • Organisational resources; • Communication • Coordination; • * Risk monitoring; 	<ul style="list-style-type: none"> • Organisational resources, • Organisational structure; • Managerial style; • Organisational ideology; • Project monitoring and control • Change management • Effective communication • Effective coordination; • * Risk monitoring; 	<ul style="list-style-type: none"> • Organisational resources management • Organisational structure definition • Effects of managerial style • Organisational ideology; • Project monitoring and control • Organisational change management • Effective communication and coordination; • Risk monitoring; • Stakeholder expectation management
Configure and test		Construction stage
<ul style="list-style-type: none"> • Information system function • Communication and • Coordination; 	<ul style="list-style-type: none"> • Information system function • Effective communication • Effective coordination; • Project monitoring and control • Change management 	<ul style="list-style-type: none"> • Information System Function • Effective communication and coordination • Project monitoring and control • Organisational change management
Installation and 'Go live'		'Go live' stage
<ul style="list-style-type: none"> • Change strategies (Update); • Risk management (Update); 	<ul style="list-style-type: none"> • Change strategies (Update); • Risk management (Update); • Effective communication • Project monitoring and control • Change management 	<ul style="list-style-type: none"> • Change strategies (Update); • Risk management (Update); • Effective communication • Project monitoring and control • Organisational change management

In the case of midsize businesses it was argued that the complexity would increase if the organisation functions as a subsidiary or a larger corporation and the implementation would face complex application integration challenges in addition to business process activities. In the fifth week of discussion, factors identified from literature and also those suggested by

experts in the first week of discussion were presented for comments. Finally an encapsulated view of organisational factors is provided as an outcome of the fifth week discussion.

People factors:

In the fifth week of the panel, while discussing people factors, there were some key components were discussed. For instance, the experts highlighted the significance of team building and suggested the need to outline activities that are crucial for team performance. Similarly, a need to have a conflict resolution mechanism was argued and suggested that for ERP implementation an appropriate conflict resolution strategy should be developed. It was also recommended to have a staff incentive strategy, as that would bring positive change on the morale and momentum. Similarly a need to have an effective communication strategy and stakeholder management strategy was discussed.

Table 5.10 provides a combined view of the people factors from the initial iteration of the model (refer Table 5.5). In addition, based on first week feedback along with Week five suggestions, final changes are also presented to reflect the change transition.

Table 5.10: Updated people factors

People Factors (Before review and analysis)	People Factors (After first week review)	People Factors (Post review and analysis)
Pre-planning		Pre-planning stage
<ul style="list-style-type: none"> • Communication strategies; 	<ul style="list-style-type: none"> • Communication strategies; 	<ul style="list-style-type: none"> • Communication strategies; • Conflict resolution procedure
Planning		Planning stage
<ul style="list-style-type: none"> • Training strategies; • Change management; 	<ul style="list-style-type: none"> • Training strategies; • Change management; • Team competence • * Clarity in communication; 	<ul style="list-style-type: none"> • Training strategies • Change management; • Team competence • Clarity in communication • Team building • * Incentives with deliverables.
Setup, Reengineering, Design		Build Stage
<ul style="list-style-type: none"> • Staff attitude to change; • Management attitude; • Staff engagement; 	<ul style="list-style-type: none"> • Staff attitude to change; • Management attitude; • Staff engagement • In-house expertise • Clarity in communication • Communication transparency • Internal and external team engagement 	<ul style="list-style-type: none"> • Staff attitude to change • Management attitude • Organisational staff engagement • In-house expertise • Clarity in communication • Communication transparency • Internal and external team engagement • Team management and control • Business support for UAT team
Configure and test		Construction stage
<ul style="list-style-type: none"> • Staff involvement; 	<ul style="list-style-type: none"> • Staff involvement; • In-house expertise; • Communication transparency • Internal and external team engagement 	<ul style="list-style-type: none"> • Staff involvement; • In-house expertise; • Communication transparency • * Internal and external team engagement
		Testing
		<ul style="list-style-type: none"> • Key users involvement
Installation and 'go live'		'Go live' stage
<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); 	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • End user engagement 	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • * End user engagement

5.5 Summary and model changes

5.5.1 Chapter summary

This chapter is comprised of the details of the first data collection stage; the expert panel. It provides information on the process used to induct experts from a variety of different academic and professional backgrounds along with the execution of the online expert panel. At the start of the chapter, details of method used to select and engage with the experts was provided, followed by the discussion structure, its pattern and key points. The chapter provides details of the comments made by experts, as presented in the discussion. The relevance of the comments was then analysed and model content was refined accordingly.

The online expert panel interface was developed using a free blog hosting website. The literature based ERP adoption/implementation model was presented for expert's comments over the period of five weeks. In the first week, a high level structure of the model was discussed with the purpose of obtaining a general perspective on ERP implementation and midsize businesses with reference to technical, organisational and people domain factors. The responses received were positive while one expert questioned reason of separating midsize business factors from other ERP implementation factors, as most of them are inter-related. It was suggested to merge midsize business factors within other implementation factors to maintain consistency. ERP implementation stages including: Pre-planning, Planning, Setup & Re-engineering, System Design, Construction (Configure & Testing) and Installation & Go live were presented from an overview perspective. In response, the experts suggested activities to be considered in the model. To avoid repetition in discussion in the later weeks, newly suggested activities were added to the model.

In the second week, ERP implementation processes and activities identified from the literature were discussed. The experts were requested to comment on the sequence, relevance and composition of the activities, identified in six stages of implementation. Similarly, the emphasis in the third week was on midsize business specific factors relating to ERP implementation. The experts actively participated in the discussion and provided comments to change/update or relocate factors within stages as relevant to their knowledge and/or experience.

In the fourth week, experts were presented with technical factors relating to ERP implementation in midsize businesses and in the fifth and final week, the experts were presented with the organisational and people domain factors. The experts indicated that ERP

implementation projects are different from typical ICT projects and have significant organisational change implication. It was also stated that by implementing ERP applications, hundreds of business processes can be replaced by ERP best practice business processes and this would require training, complex integration and data conversion management.

5.5.2 Model content changes

Table 5.2 provided the ERP adoption model content view based on the literature analysis. In the first week of expert panel discussion, the experts provided feedback on the overall model construct, its content and suggested factors that should be considered. Based on the expert opinion drawn from the first week of discussion, the model content was revised (Table 5.5) to encapsulate the literature analysis with expert suggestions for further testing. At the end of first week discussion, the new changes in the model were summarised and now at the end of expert panel discussion, Table 5.11 provides a revised view based on discussions during five consecutive weeks of the expert panel including, ERP implementation activities, midsize business, technical, people and organisational domain factors. The new changes suggested by experts in the model content are presented in *red* text for clarity.

Project closure and transition stage

Initially, the closure stage was not included in the expert panel presentation however, during the second week whilst discussing ERP activities, the experts argued the significance of “the closure” stage for project monitor, control and delivery. It was stated that this stage could assist by mapping deliverables against business requirements and help analyse the benefits realised for process improvement. As a result, based on the expert’s suggestions, a new stage “project closure and transition” was identified containing activities including: ‘shakedown and stabilisation period’, ‘post-implementation review’, ‘system enhancement (including repairs and extensions)’, ‘business process transformation’, ‘support procedure definition (setting priorities for issue resolution and approval mechanisms)’ and ‘improvements/application upgrade’ activities.

As this study specifically focuses on ERP implementation in midsize businesses and post-implementation adoption issues were excluded from its scope, the “project closure and transition” stage activities have been listed for reporting but will not be used for further analysis or examination.

Table 5.11: Revised ERP adoption model based on Expert Panel

Stages	Activities	Midsize Business	Technical	Organisational	People
		<i>(Factors associated to ERP implementation)</i>			
Pre-Planning Stage	Business case development/ project charter Decisions leading to financial approval Identify key stakeholders and manage Formation of steering committee Project scope determination Identification of key business process ERP application selection Higher level relationship building	Strong business case External organisational factors Macro environmental factors Business and technology issues; Strategic management issues; Political support Knowledge of the business Limited resources (Skills) Technical requirements analysis	Business requirements identification Technical requirements identification Application understanding and usefulness Impact of technology	Change management ; Risk management; External organisational factors Organisational knowledge Political support Cross organisational business functions	Communication strategies; Conflict resolution procedure
Planning Stage	Project scope determination Project team setup Resource determination Inter-team communication Implementation methodology Project plan development	Cultural factors (local, national) Government or regularity change Industry standards Selection criteria with relevant parameters per business needs Availability of accurate and relevant information on ERP applications, Limited resources (budget) Effective time management Project leadership (risk and issues) User and support base for application Less reliance on sales advice, External environmental factors Detailed project plan with an effective communication strategy Limited resources (people/skill)	Time and Cost of implementation New technology adoption issues Industry standards Proposed application System Architecture analysis Technical staff/consultant expertise Realistic end user expectation analysis (<i>minimal or no customisations</i>) Identify value stream for organisation	Organisational change management Project management; Risk planning and monitoring; Effective communication strategy, based on “who, what, when and how” Clear and well defined objectives Define individual and collective benefit Executive management commitment Business impact analysis, Effectiveness techniques for communication (survey)	Change management; Clarity in communication Team competence Training strategies Team building Incentives with deliverables.
Build Stage	Setup Team structure identification Technical and functional staff training Team integration, Project team selection (mix blind of people with different expertise level) Reporting processes Reengineering Guiding principles Business process analysis Installation of ERP application Business Process mapping Internal expectations management Plan and initiate end user training System Design High level designing Additional details for user acceptance Interactive prototype User communication	Limited resources (Budget) Limited resources (People/Skill) Trained business staff Professional external consultants Temporary staff to backfill existing business staff Situational leadership issues Issues due to mergers/ acquisitions Business and technology issues Cross dimensional factor impact	ERP complexity; Cost of implementation In house expertise; ERP compatibility issues with other applications Develop a system design strategy	Organisational resources management Organisational structure definition Effects of managerial style Organisational ideology; Project monitoring and control Organisational change management Effective communication and coordination; Risk monitoring; Stakeholder expectation management	Staff attitude to change Management attitude Organisational Staff engagement In-house expertise Clarity in communication Communication transparency Internal and external team engagement Team management and control Business support for UAT team

Stages	Activities	Midsize Business	Technical	Organisational	People
Construction Stage	<u>Configuration</u> Comprehensive software configuration System integrations Data conversion Data migration <u>Other Activities</u> Perform end user training Scope freeze	<u>Configure</u> Limited resources (Budget) Limited resources (Skill); Issues due to mergers/ acquisitions	ERP installation aspects; Cost of implementation Data migration	Information system function Effective communication and coordination Project monitoring and control Organisational change management	Staff involvement; In-house expertise; Communication transparency Internal and external team engagement
	<u>Testing</u> Build test scripts and interfaces Unit testing Write and test reports Regression/ system testing Prototype test with integrated business cases Real time data in test instance Application integration testing Performance testing User acceptance testing (UAT) Complete end user training	<u>Testing</u> Limited resources (Budget) Cross dimensional factor impact Dedicated resources (people/skill) Issues due to Mergers/ Acquisitions	Early development of strategy Strategy communication Data quality analysis and cleansing Application integration Identify systems for integration	Key users involvement	
'Go live' Stage	Building network and new infrastructure Post transition support to fix glitches Loading of master and transactional data, Any manual work to get system ready Data validity verification on final cutover	Business and technology Issues (Update); Strategic management Issues (Update); <u>Operational implication analysis</u> ERP business functional impact Succession planning Knowledge management for ERP maintenance/support Effectiveness of inter-organisational system integration	ERP implementation issues (Update);	Change strategies (Update); Risk management (Update); Effective communication Project monitoring and control Organisational change management	Staff attitude to change (Update); Management attitude (Update); End user engagement

Please note, changes made in the model are specified in **red** text for clarity

5.5.3 Model revision for further testing

As mentioned earlier, the purpose of this research has been to perform factor impact analysis on midsize business with reference to their ERP implementation experience. To narrow down the focus of the study, the researcher intended to analyse the relevance of midsize business factors with technical, organisation and people domain in the first data collection stage (expert panel). Consequently, the researcher wanted to relate the midsize factors specifically to the general ERP factors within their domain classifications (technical, organisation and people) for a consolidated presentation of the model. In addition, Expert D also questioned the reasoning behind separating midsize business factors from other ERP implementation factors, as they co-relate and co-exist. Subsequently, at the end of expert panel discussion, whilst a revised model has been completed; it was important to revise and amalgamate midsize factors into technical, organisational and people domains factors before the next data collection stage. To summarise, the model will now be presented with midsize business factors re-incorporated into the technical, organisation and people domains. The following alterations have been made.

Table 5.12 provides a revised model presentation with following changes:

- The heading “Technical” has been changed to “Technology”, as the word technology has broader meaning in thematic sense whilst technical relates to specifically technical tasks, issues or implementation deliverables.
- Midsize business factors were merged into technology, organisation and people domains, as deemed relevant. The midsize business factors were specified in red text for clarity of presentation.
- The technology, organisational and people domain factors were reorganised to align relevant factors in order for consistent presentation.
- *Pre-planning stage:*
 - In the technology domain, midsize business factor ‘*technical requirement analysis*’ was added as sub-factor of ‘business requirement identification’. In addition, midsize business factor ‘business and technology issues’ was also added.
 - In the organisational domain, ‘*Business functional knowledge*’ was added as sub-factor of organisational knowledge because functional knowledge can only be a component of entire organisational knowledge. In addition, five other midsize business factors were also included: ‘develop strong business case’,

'organisational political support', 'strategic management Issues', 'external organisational factors' and 'macro environmental factors'.

- In the people domain, only one midsize business was added: limited resources (skills).
- *Planning stage:*
 - In the technology domain, there were four midsize business factors were included. For instance: 'selection criteria with relevant parameters', 'accurate information on ERP applications', 'industry standards' and 'Less reliance on sales advice'.
 - In the organisational domain, there were three factors included: 'cultural factors (local, national)', 'government or regularity change' and 'external environmental factors', along with three other project related factors are relocated under project management heading, including: 'detailed project plan & communication strategy', 'project leadership (risk & issues)' and 'limited resources (budget)'.
 - In the people domain, three midsize business factors were included: 'user support base for application', 'limited resources (people/skill)' and 'effective time management'.
- *Build stage*
 - In the technology domain, only one midsize business factor was added: 'business and technology issues'.
 - In the organisational domain, there were four midsize business factors included: 'limited resources (budget)', 'situational leadership issues', 'issues due to mergers/acquisitions' and 'cross dimensional factor impact'. As the midsize business factor 'limited resources (budget)' was relevant to organisational domain factor 'cost of implementation' therefore, it was added as the sub-factor.
 - In the people domain, a total four midsize business factors were added while three were added as sub-factors of 'limited resources (people/skill)'. The sub-factors include: 'trained business staff', 'professional external consultants' and 'temporary staff to backfill existing business staff'.
- *Construction stage*
 - There were no midsize factors added in the technology domain of the construction stage.

- In the organisational domain, three midsize business factors were added: 'limited resources (budget)', 'issues due to mergers/acquisitions' and 'cross dimensional factor impact'.
- In the people domain, two midsize business factors were added: 'limited resources (skill)' and 'dedicated resources for testing (people/skill)'.
- *Go live stage*
 - In the technology domain, four midsize business factors were added, two of them as sub-factors. These were 'business & technology Issues (update)', 'operational implication analysis'; and its sub-factors 'knowledge management for ERP maintenance/support' and 'effectiveness of inter-organisational system integration'.
 - In the organisational domain, three midsize business factors were added: 'strategic management issues (update); 'operational implication analysis' and its sub-factor '*ERP business functional impact*'.

In the people domain, three midsize business factors were added, two of them being sub-factors. 'operational implication analysis' factor and its sub-factors, 'knowledge management for ERP maintenance/support' and 'succession planning'.

Table 5.12: ERP adoption model [revised for case study analysis]

Stages	Technical	Organisational	People
		<i>ERP in Midsize Business Factors (Baseline for case study)</i>	
Pre-Planning Stage	<ul style="list-style-type: none"> • Business requirements identification <ul style="list-style-type: none"> ◦ <i>Technical requirements analysis</i> • Technical requirements identification • Business & Technology Issues; • Application understanding & usefulness • Impact of technology 	<ul style="list-style-type: none"> • Organisational Knowledge <ul style="list-style-type: none"> ◦ <i>Business functional knowledge</i> • Develop Strong business case • Cross organisational business functions • Organisational Political support • <i>Change and Risk Analysis;</i> • <i>Stakeholder expectation Analysis;</i> • Strategic management Issues; • External organisational factors • Marco environmental factors 	<ul style="list-style-type: none"> • Limited resources (Skills) • Communication Strategies • Conflict resolution procedures
Planning Stage	<ul style="list-style-type: none"> • Selection criteria with relevant parameters • Accurate information on ERP applications • Less reliance on sales advice • Time & Cost of implementation • New technology adoption issues • Industry standards • Proposed application System architecture analysis • Technical staff/consultant expertise • Realistic “end user” expectation analysis (<i>Minimal or no customisations</i>) • Identify value stream for organisation 	<ul style="list-style-type: none"> • Cultural factors (local, national) • Government or regularity change • External environmental factors • Project Management; <ul style="list-style-type: none"> ❖ <i>Detailed project plan & communication strategy</i> ❖ <i>Project Leadership (risk & issues)</i> ❖ <i>Clear & well defined objectives (Scope)</i> ❖ <i>Organisational change management</i> ❖ <i>Risk Planning & Monitoring;</i> ❖ <i>Effective Communication strategy, “who, what, when how”</i> ❖ <i>Effectiveness techniques for communication (survey)</i> ❖ Limited Resources (Budget) • Executive Management Commitment • Business impact analysis, <ul style="list-style-type: none"> ◦ <i>Definition of individual and collective benefits</i> 	<ul style="list-style-type: none"> • User support base for application • Limited resources (people/skill) • Effective time management • Change Management; • Clarity in Communication • Team Building • Team Competence • Training strategies • Incentives with deliverables.
Build Stage	<ul style="list-style-type: none"> • ERP complexity; • In house expertise; • Cost of implementation • ERP compatibility issues with other applications • Development of a system design strategy • Business & Technology Issues 	<ul style="list-style-type: none"> • Cost of implementation <ul style="list-style-type: none"> ◦ Limited Resources (Budget) • Situational Leadership issues • Issues due to Mergers/ Acquisitions • Cross dimensional factor impact • Project Management; <ul style="list-style-type: none"> ❖ <i>Project monitoring & control</i> ❖ <i>Risk Monitoring;</i> ❖ <i>Stakeholder expectation management</i> ❖ <i>Effective Communication & Coordination;</i> ❖ <i>Organisational change management</i> ❖ <i>Organisational resources management</i> • Organisational structure definition • Organisational Ideology; • Effects of managerial style 	<ul style="list-style-type: none"> • Limited Resources (People/Skill) <ul style="list-style-type: none"> ◦ Trained business staff ◦ Professional external consultants ◦ Temporary staff to backfill existing staff • In-house expertise • Team management & control • Change Management <ul style="list-style-type: none"> ❖ <i>Business support for UAT team</i> ❖ <i>Staff attitude to change</i> ❖ <i>Management attitude</i> ❖ <i>Organisational Staff engagement</i> • Clarity in communication • Communication transparency • Internal & external team engagement

Stages	Technical	Organisational	People
Construction Stage	<ul style="list-style-type: none"> • ERP installation aspects; • Cost of implementation • <u>Data migration</u> <ul style="list-style-type: none"> ❖ Early development of strategy ❖ Strategy Communication ❖ Data quality analysis & data cleansing • <u>Application integration</u> • Identify systems for integration 	<ul style="list-style-type: none"> • Limited Resources (Budget) • Issues due to Mergers/ Acquisitions (Impact of scope change on project) • Cross dimensional factor impact • Information System Function • Effective Communication & Coordination • Project monitoring & control • Organisational change management 	<ul style="list-style-type: none"> • Limited Resources (Skill); • Staff Involvement; • In-house expertise; • Communication transparency • Internal & external team engagement • Dedicated resources for testing (people/skill) (An ability to fix defects in testing) • Key users involvement for testing
'Go live' Stage	<ul style="list-style-type: none"> • ERP implementation issues (Update); • Business & Technology Issues (Update); • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ <i>Knowledge management for ERP maintenance/support</i> ❖ <i>Effectiveness of inter-organisational system integration</i> 	<ul style="list-style-type: none"> • Strategic Management Issues (Update); • Change strategies (Update); • Risk Management (Update); • Effective Communication • Project monitoring & control • Organisational change management • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ <i>ERP business functional impact</i> 	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • End user engagement • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ <i>Succession planning</i> ❖ <i>Knowledge management for ERP maintenance/support</i>

Please note, the content comprised of midsize business factors relocated in organisational, technical and people domains. The midsize business factors are identified in **red**

Chapter Six

Phase two: Case study results and discussion (part one)

6.1 Case study results

This chapter discusses the data gathering exercise as part of the case study analysis from midsize and large size businesses in Australia. In this chapter, the researcher investigates six cases involving a large size, a small business, midsize businesses and an ERP provider.

The case study interviews were conducted as part of the second stage of this research. This chapter will provide details of the data collection process including how cases were selected; their background and discussion on the parts of the model content based on the case study organisation's ERP implementation experiences. The case study results are divided into two chapters and in the next chapter the remaining components of the model based on case study organisations will be discussed.

The case study results are organised in following way:

- Overview of cases (Chapter Six)
- Case Backgrounds (Chapter Six)
- Discussion on each of the ERP Implementation stages (Chapter Six)
- Discussion on Planning stage (Chapter Six)
- Discussion on Build Stage (Chapter Seven)
- Discussion on Construction Stage (Chapter Seven)
- Discussion on Go Live stage (Chapter Seven)

6.2 Overview of cases

The implementation outcomes of ERP can vary based on the size and scale of operations (Haddara & Zach, 2011). The primary focus of this stage of the study was to analyse ERP adoption and implementation factors relevant to midsize businesses. It was decided to include one large size organisation, a small business and an SME implementer (third party services provider) in addition to three midsize businesses. It was decided to include one large size organisation, a small business and an SME implementer (third party services provider) in addition to three midsize businesses. The strategy of analysing small/ midsize/ large size businesses allowed the researcher consider issues faced by businesses of different sizes. It also enabled the researcher to refine the analysis and analyse the proposed model content on aspects relating to ERP implementation. In addition, the views of SME implementer enabled the researcher to record an external "non-business" perspective. It also allowed the

researcher to obtain an extended view on issues and challenges faced by midsize businesses. The case study analysis helped to relate factors identified in the model, interpreting how each factor is relevant to potential significance with case study organisations' implementation experiences.

For the case study, cases were selected in accordance with the research definitions for the small, midsize and large size businesses on following parameters:

- A large size organisation with ERP implementation experiences,
- An SME Implementer (services provider) with a significant ERP implementation experience with small and midsize businesses,
- Three midsize companies with at least one or more ERP implementations.
- One small size organisation with at least one or more ERP implementations.

6.2.1 Case study - Selection of cases

Several approaches were used to obtain the desired balance of cases as described in the previous section:

- Published material on ERP implementation: Several success stories on ERP implementation in SMEs were published on the SAP website (<http://www.sap.com/australia>). These were downloaded and reviewed in February 2012. After analysing the suitability of each target organisation based on their size and scale of operations, ten companies were selected and contacted for interview. Two organisations agreed to participate.
- Contacts provided by Co-Supervisor: It was important to obtain the perspective of an implementation partner with enriched experience of implementing ERP in small and midsize businesses. Therefore, my co-supervisor provided contact details of an implementation services provider that specialised on ERP implementations in small and midsize businesses. Two senior members of the business' implementation team participated in the interview.
- Professional contacts: The researcher used his own professional contacts to identify small-midsize companies with ERP implementation experience. The professional contacts were also used to establish first contact with selected companies to obtain their consent to participate in the research study. Two companies that had previously

experienced ERP implementations (but not SAP) agreed to participate in the study, adding different ERP vendor experiences.

- Large size organisation: This was a convenience selection which enabled the researcher make comparisons with a large size enterprise. In this case the business was the researcher’s own employer. The researcher’s role was the Implementation Manager for an ongoing ERP implementation project. The Large size case was a Dual Sector University that went through two major ERP implementations in 2008-09.

6.2.2 Ethical issues

Based on the University’s ethics committee guidelines, all interviewees were requested to declare whether they wish to remain confidential or would allow the researcher to publish their identities. All participants of the data collection process decided to remain **unidentified**, hence their details remain confidential.

6.2.3 Case study – Presentation of cases

Table 6.1 and figure 6.1 provide further details of the case businesses.

Table 6.1: Details of case businesses

No#	Case Type	Description	Interviewee(s) Roles
1.	Large Enterprise	Dual Sector University – Regional Victoria.	<ul style="list-style-type: none"> • Project Technical Resource Manager (Pilot - LE-1) • Project Testing Manager (LE-2)
2.	MID-1 (MID-1)	Value Added reseller – ICT hardware reseller	<ul style="list-style-type: none"> • Chief Operations Officer and <i>Project Sponsor</i>
3.	MID-2 (MID-2)	Car Parking Services Provider	<ul style="list-style-type: none"> • Finance Controller and <i>Project Sponsor</i>
4.	SME (SME)	Voice and Data services providers	<ul style="list-style-type: none"> • Finance Admin Manager and <i>Functionality ‘End User’</i>
5.	MID-3 (MID-3)	Automobile reseller and distributor	<ul style="list-style-type: none"> • Solution Architect and <i>Project Expert</i>
6.	SME Implementer	ERP implementation services provider (implementation partner)	<ul style="list-style-type: none"> • National Solutions Lead • Solution Architect <i>(Two experts)- Project and Technical participated in a single interview</i>

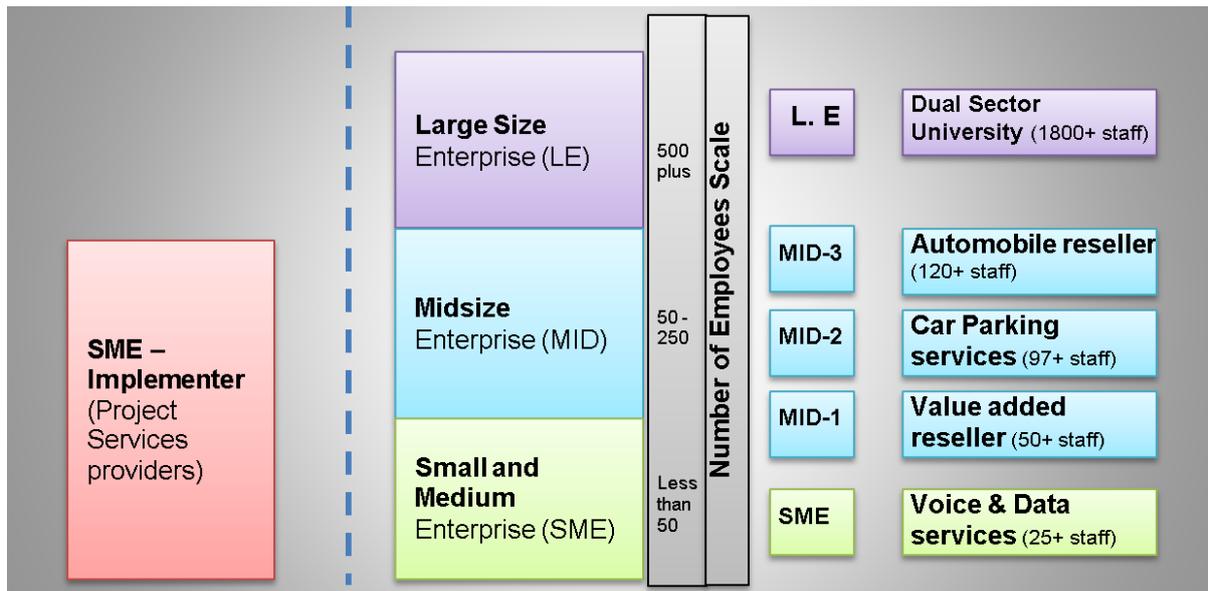


Figure 6.1: Scale of case businesses

6.3 Background of cases

This section provides the background for each of the cases in the study. Each case interview involved a list of questions asked in an informal manner. Each interviewee was provided with an opportunity to review or change the model contents based on their prior experience with ERP implementations.

6.3.1 The interview process

At the start of each interview, a series of questions were asked about the organisation and their experience with ERP implementation. Each interviewee was asked about the size and the nature of their business, the geographic location, the number of full equivalent staff, their implemented ERP product and some details on their organisational background.

Then, a brief overview on the research topic was provided along with the model structure and its content. This included the research model, information on the implementation stages and factors within the organisational, technology and people domains.

The interviewees were requested to consider the model in regards to their professional knowledge and experiences. Then, the interviewees were requested to provide feedback on the model composition, the listing of factors in each stage of the implementation and the sequence of their occurrence.

During the interview, feedback was noted on a printed copy of the proposed model. Additionally, the interview audio was recorded for later analysis.

The interviewees were also requested to clearly state whether the recommendations made were based on their practical knowledge and experiences with ERP or based on their knowledge of 'best practice' .

6.3.2 Case one – Dual sector University in Australia (LE)

The first case was an educational institution in a regional Australia. The University offered both Higher Education (HE) and Vocational Educational Training (VET) courses stamping itself as a 'Dual sector institution'. As an Australian education institution, the University sourced its funding for major infrastructure upgrade from State and Federal governments grants to improve its physical and ICT infrastructure. At the time of interview, the University had around 1800 full equivalent staff. Most of the University campuses were located in regional towns. The target market of the University was identified as local, state-wide, national and international students.

6.3.2.1 Case background

In 2006, the University decided to replace its legacy Higher Education student management system. The decision was based on an internal risk review conducted by University management that expressed strong reservation about the then in-house development and enhancement of student management applications. In response, the University went through a procurement process to select a suitable vendor for an enterprise student management application and for the project implementation partner. As a result, Oracle PeopleSoft Campus Solution (an ERP application) was selected to replace the University's legacy higher education student management system. Similarly, the University took an executive decision to also replace its financial management system, aligning both enterprise applications on a unified PeopleSoft platform. As a result, Oracle-PeopleSoft Campus Solutions was implemented as the Higher Education Student Management system from April 2007 – Sept 2008 and Oracle-PeopleSoft Financials was implemented from Jan 2008 – Jan 2009.

The total budgetary allocation for PeopleSoft Campus Solution was \$7 million and PeopleSoft Financials was implemented with \$5 million. For the implementation, *Oracle PeopleSoft Compass methodology* was used and Oracle Consulting Pty Ltd was appointed to assist with both implementations.

6.3.2.2 Interview one: “the pilot” – LE1

Due to the sheer volume of data required to be tested at each case organisation, it was decided to conduct a proof of concept (POC) in the form of a pilot interview before initiating the actual interviews. The selection of the case was a convenience decision, given the researcher was working for a Dual Sector University at the time of the interview. The pilot interview enabled the researcher to test the case study interview structure and ‘baseline’ its findings for subsequent case study interviews (for effective time management). The purpose was to test the revised ERP adoption model (based on Expert Panel feedback) and obtain feedback based on interviewees’ implementation experiences. The limitation of selecting a large enterprise as pilot was that, initially, midsize business experiences were not recorded. However, at the early stage of analysis structuring the interview questions, recording the interview pattern and time-stamp was the key focus. It was also important to note that in the subsequent case study interviews, pilot baseline information assisted the interviewer to obtain valuable insights in a consolidated and timely fashion. Overall, the pilot interview assisted with the case study process formulation and did not prejudice the other small and midsize case studies, which were the main focus. It is also important to note that at the end of each interview, suggestions made by each interviewee were recorded and used in the analysis for potential model modifications.

The pilot interview was conducted in August 2011 and the interviewee was the Technical Resource Manager for both ERP applications implementation (PeopleSoft Campus Solutions and PeopleSoft Financial) from March 2007-Dec 2008. The interviewee was requested to map their practical experiences with ERP implementation on the proposed model and suggested changes and/or its composition. It was mentioned by the interviewee that the Technical budget was sufficient for both implementations and within the budget. Adjustments were made to purchase additional equipment and hire extra staff when required.

6.3.2.3 Reflection on the pilot

As there were only minor improvements made to the interview process after the initial interview it was felt that the pilot interview could be included in the overall case analysis.

Primarily, there were no changes made in the model composition or content or the pattern of the discussion. Importantly, the pilot was used to test the entire interview process to confirm that it could be completed within one hour, while confirming the sequence of questions along with the pattern of interview. Due to sheer volume of data to be discussed, it was important to test the entire discussion in a comfortable environment. Given the fact that the researcher was working for the University at the time of interview, it was convenient to test the pilot with a professional contact who played a vital role in the implementation of ERP applications at the University. The interview was completed within an hour (precisely as planned) and implementation knowledge combined with technical expert opinion was received that was later used in the research analysis.

After deciding to proceed with the inclusion of the Dual Sector University in the analysis, another staff member from the same organisation was interviewed. This was to ensure that the findings obtained from first interview (pilot) were confirmed and the model content vigorously tested. Both interviewees provided valuable information based on their professional experiences with ERP implementation.

6.3.2.4 Interview two – LE2

As the Dual Sector University was the only large size case, a second interview was organised with another staff member who had participated actively in the both implementations.

For both implementation projects (PeopleSoft Campus Solutions and PeopleSoft Financials), the second interviewee served as Testing Manager. At the time of interview (November 2011), the interviewee was Manager SCIP (Strategic Capital Infrastructure and Project office) at the University. The interview was conducted in November 2011.

6.3.3 Case two - Value added reseller IT hardware (MID-1)

The second case organisation was a small-midsize value added reseller, mainly dealing in ICT equipment and related services.

6.3.3.1 Background

The organisation was a privately owned business primarily delivering value added ICT hardware and software services. The organisation had over 50 full time equivalent staff with offices in Brisbane, Melbourne and Sydney. The organisation could be classified as a midsize business based on the research definition.

The organisation had implemented two ERP applications. The first was JD Edwards Financials application, replacing their legacy Finance management system and the second was Microsoft Dynamics Customer Relationship Management (CRM) application, replacing a Sales Force system. The JD Edward implementation was outsourced to an implementation service provider and was completed in six months. The MS Dynamics CRM project was 60% outsourced - 40% in house implemented. This composition was carried out primarily to ensure an effective knowledge transfer and change management process delivery. The CRM project had two stages; in the first stage the organisation implemented the basic foundations of the CRM application. This was completed in three months. The second stage comprised expanding the CRM application to replace the entire legacy system (Sales Force system). It was planned to have it completed in six months. At the time of interview the second stage of the project was in progress. The total cost of JD Edward implementation was \$100,000 and the projected cost for CRM implemented was \$150,000. The organisation relied on the implementation partner's project manager for the first project execution and the vendors' (Oracle and Microsoft) preferred implementation methodology was used for both projects.

6.3.3.2 The interview

The interview was conducted in September 2011 and the interviewee was the Chief Operating Officer for the company at the time. In addition, the interviewee was the executive and business sponsor for both projects with management control over implementations. At the start of the interview process a series of questions were asked to obtain an overall view of the implementation experience. Based on JD Edward implementation experiences, the CRM implementation was managed and controlled internally. The interview was completed within an hour and focused on obtaining a detailed insight on the ERP implementation experiences of the case organisation. The entire discussion and feedback was recorded for later review.

6.3.4 Case three - Car park management services provider (MID-2)

The third case organisation was a privately owned *car park management services provider* with a key focus on providing car parking facility services to hospitals and other commercial parking. The organisation was based in Brisbane, Melbourne and Sydney.

6.3.4.1 Background

The organisation primarily delivered services to the hospital but they had two other commercial car parks as well. Additionally they managed nine car parks that were owned by another company. At the time of interview, the organisation had approximately 97 full time equivalent staff at several locations, including at the head office in Melbourne (classifying the organisation as a midsize business as per the research definition).

The company took an executive decision to replace its legacy Finance management system due to its growth requirements. The company implemented SAP BusinessOne after a procurement evaluation process. The project was executed with assistance from a reseller/ implementation services provider. The implementation was completed in seven months; consisting of an initial three months requirements gathering exercise, followed by application design and recording the legacy system data input, etc. Finally, four months were spent on data import and practical sanity check (a process to variously test the new system for identification of defects and rectification). The project cost \$65,000 to implement. The reseller used SAP implementation methodology in the project and the product met most of the business' key requirements, hence they were satisfied with the implementation.

6.3.4.2 The interview

The interviewee was the General Manager of the company and the Financial Controller at the time of ERP implementation. He played a vital role in the implementation starting from project initiation, planning, vendor selection, functional requirements provision and coordinating user acceptance testing. The experience of the interviewee enabled him to provide detailed insights of their implementation experiences including issues faced and lessons learnt. Furthermore, whilst analysing the composition of the model and associated factors, the interviewee was able to map the practical experiences of the business and also suggested changes to the model. The comments made at the interview were recorded for later review.

The interview was conducted in May 2012 and was completed in one hour.

6.3.5 Case four - Voice and data services provider (SME)

The fourth case organisation was a privately owned small business specialising in voice and data services. The primary focus of the business was resale and distribution of PABX

(telephone) hardware along with provision of its installation, support and maintenance services.

6.3.5.1 Background

The case organisation had a business focus on several different interstate locations. At the time of interview, the organisation had 25 full time equivalent staff with at least two thirds of its staff located at interstate locations. As per the research definition, this organisation was classified as an SME for the research purposes. The company decided to replace its Finance application (MYOB) with SAP Business One to manage the company finances and support its ordering, billing and taxation functions. It was indicated that MYOB was still used, as SAP Business One was implemented with minimal customisation. This was because any process modifications to Business One required costly customisations with added cost. Hence, it was decided to perform certain functions in MYOB, whilst the core financial management functions were completed in Business One.

The organisation was based in Melbourne CBD and had several interstate support locations. The target market for the business was domestic, state and national. The implementation project was completed at a cost of \$60,000 – \$80,000. The initial budget was not sufficient to complete the implementation and additional funding was made available to complete the project. It was also stated that the SAP implementation methodology was used by the reseller.

6.3.5.2 The interview

The interview was conducted in June 2012 and was completed in just less than an hour. The interviewee was Financial Administration Manager for the company and was a key stakeholder of the ERP implementation. The interviewee played a vital role in the implementation as a key user of the application. It was also noted that this implementation significantly impacted the interviewee's work practices as an end user, due to business process change and standardisation of functionality processes. The interview was recorded for later review.

6.3.6 Case five - Automobile resale, distribution & services (MID-3)

The fifth case organisation was a privately owned automobile reseller distributor of a multinational automobile manufacturer. The organisation was in the distribution and resale

business and it was also providing maintenance, support and spare-part services for automobiles.

6.3.6.1 Background

The case organisation provided automobile sales and after sale services and was a subsidiary of a large multinational automobile manufacturing company. The business focus was on domestic, state-wide, national and some international markets. The organisation had over 120 full time equivalent staff, classifying it as a midsize business as per the research definition.

It was stated that due to a bad experience of the parent (automobile manufacturing) company with ERP implementation (JD Edwards), the case organisation was influenced by the parent company to be cautious whilst selecting such an application. The case organisation had significant functional and data integration requirements with the parent company for goods and services; hence their selection decision was to be endorsed by the parent company's international Head Office in Japan. The organisation spent several weeks conducting market surveys analysing available applications and packages and ran a closed tender. Finally they decided to implement a *supply chain module* of Movex by Intentia (that later merged to become Lawson in 2005). Subsequently Lawson was acquired by Infor Global Solutions in 2011. As the selection decision was made in 2001, the major ERP vendors were not focusing on small-midsize businesses; hence the product was not selected from the vendor group now considered to be the market leaders. The organisation was only interested in an ERP solution that was expected to fit with their business needs. The total budget for implementation was approximately \$2million and the project was completed within the budget allocation. The vendor based implementation methodology was applied.

6.3.6.2 The interview

The interview was conducted in July 2012 and completed within one hour. The discussion was recorded for later review. The interviewee was part of the application selection team and later served as the Solution Architect. The interviewee was working for a consulting firm at the time of implementation delivering professional consulting services to the case organisation. At the time of interview, the interviewee was working for another consulting firm as a senior consultant.

6.3.7 Case six - ERP implementation services provider (SME implementer)

The final case organisation was a privately owned service provider for ERP implementation services with a major focus on small and midsize businesses.

6.3.7.1 Background

The case organisation was considered to be an expert in the ERP area, primarily dealing with small and midsize business ERP implementations. The company performed ERP implementations at several organisations containing 50 to 250 full time equivalent staff. Thus, although they described themselves as an ERP implementer for SMEs; by the definitions in this thesis, they had implemented solutions in midsize businesses. The target market for the company was local, state-wide, national and international and had offices located in the CBD locations of all of the major cities of Australia and New Zealand.

The company was primarily implementing SAP products, specifically SAP BusinessOne and SAP A1 for small-midsize businesses. The company was an authorised reseller of the ERP products and professional services provider. The organisation provided implementation services to midsize businesses that normally took 6-12 months to implement, depending upon the complexities involved. In response to budgetary allocations for midsize business implementation, it was stated that budget varied depending upon the business size, requirements of each clients and the number of customisations requested. Generally, the cost ranged from \$50,000 to \$100,000. In response to the implementation methodology question, it was indicated that the ASAP (Accelerated SAP implementation methodology) was used.

6.3.7.2 The interview

The interview was conducted in April 2012. The interview was completed within one hour and two representatives from the organisation participated; one was the National Solution Lead and the second was the Solution Architect. The researcher did not request two participants. Rather the key interviewee (National Solutions Lead) brought another person with enriched technical and infrastructure knowledge. Even though it was a convenience decision on part of the interviewee; it assisted researchers to analyse both functional and technical aspect of the model thoroughly. Both interviewees had played vital roles in delivering implementation services to several midsize business customers and their professional feedback was crucial

to improve the model findings. For the purposes of the thesis, this is treated as one (albeit *combined*) interview.

6.4 The Case Study – Results, Analysis and Model modification

This section outlines the data gathering exercise conducted for the case study interviews with the case organisations. The discussion will cover different ERP implementation stages and associated factors listed within the ERP adoption model. In each stage of implementation, factors are categorised into the Technology, Organisational and People domains. At the conclusion of each stage a revised version of the model for that stage is presented. For the purposes of this data collection, ERP implementation is divided into following five stages as outline in the research model:

- **Pre-Planning Stage:** to start the implementation requirements,
- **Planning stage:** Plan for implementation – (*planning remains an ongoing process*)
- **Build Stage:** A combination of Set-up, Re-engineer, System design (functional and technical)
- **Construction Stage:** A combination of configuration, development (if customised) and testing
- **Go Live stage:** Events immediately before (sign off) and during Go Live activities.

The case study data collection comprised of six cases. Figure 6.2 once again presents the cases interviewed with relevant classifications. The first stage to be discussed is the Pre-Planning Stage.

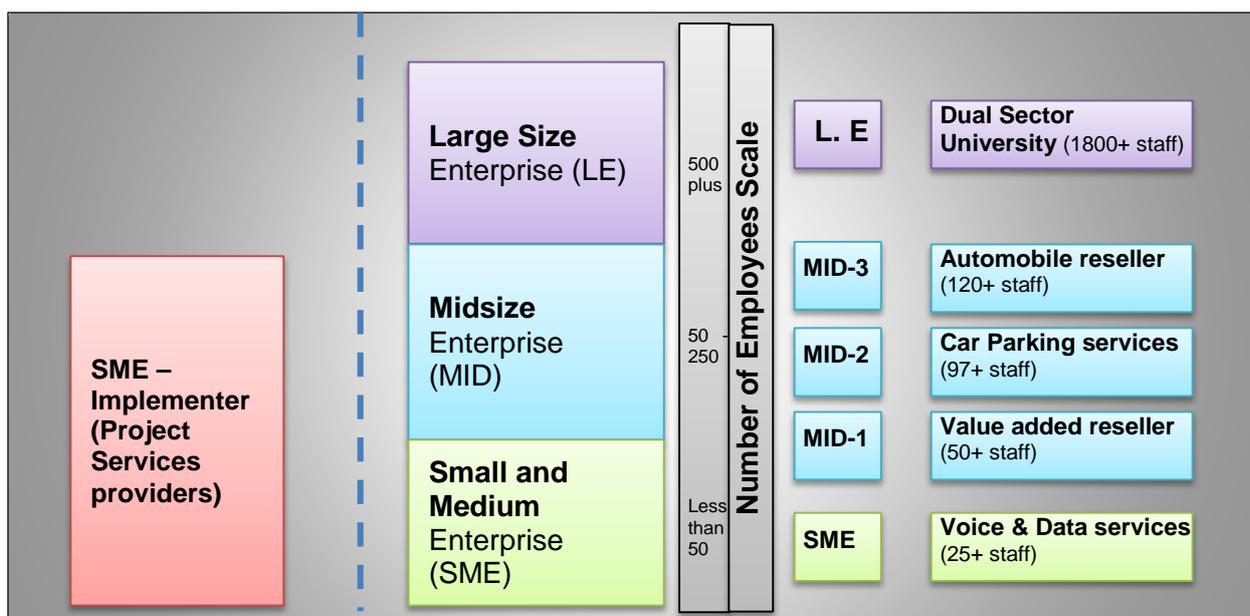


Figure 6.2: Scale of case businesses

6.4.1 Pre-planning stage

Table 6.2 presents the factors associated in the Pre-planning stage, categorised in the Technology, Organisational and People domains. The model is as presented as it was at the conclusion of the first phase of data collection (refer table 5.12). The following discussion relates to the outcome of each of the factors, after the analysis of interview results. Each factor will have one of four states:

- a) **Agreed** factors (factors remain predominantly unchanged)
- b) **Modified** factors (changes are made to the factors, but they remain where they are)
- c) **Additional** factors (new factors are added or are moved from other stages)
- d) **Removed** factors (factors are removed completely or moved to other stages)

Table 6.2 shows the pre-planning stage at the conclusion of phase one of the data collection. At the end of this section a revised version of the pre-planning stage is presented.

Table 6.2: Preplanning stage factors before case study analysis

Factors for ERP adoption	Pre-planning stage
Technology factors	<ul style="list-style-type: none"> • Business requirements identification <ul style="list-style-type: none"> ○ Technical requirements analysis • Technical requirements identification • Business & Technology Issues; • Application understanding & usefulness • Impact of technology
Organisational factors	<ul style="list-style-type: none"> • Organisational Knowledge <ul style="list-style-type: none"> ○ Business functional knowledge • Develop Strong business case • Cross organisational business functions • Organisational Political support • Change and Risk Analysis; • Stakeholder expectation Analysis; • Strategic Management Issues; • External Organisational factors • Macro environmental factors
People factors	<ul style="list-style-type: none"> • Limited resources (Skills) • Communication Strategies • Conflict resolution procedures

6.4.1.1 Technology factors

Based on the literature analysis and first data collection stage, the technology factors in pre-planning stage for midsize business comprised the following factors;

- Business requirements identification (including analysis)
 - Technical requirements analysis
- Technical requirements identification
- Business and Technology Issues
- Application understanding and usefulness
- Impact of technology

While discussing factors identified in Technical domain of pre-planning stage, both large enterprise interviewees (*LE1 - Technical Resource Manager and LE2 - Testing Manager*) acknowledged that the structure and the content presented in the pre-planning stage was generally aligned with their practical experiences. Similarly, all small and midsize cases interviewed (*MID-1 - Value added ICT hardware reseller, MID-2 - Car parking services providers, SME - Voice and Data services provider, MID-3 - Automobile reseller and distributor, SME Implementer - ERP implementation services provider*) suggested that the model presentation of factors was according to their practical experiences and/or best practice knowledge of the implementation. As indicated, the feedback received in interviewees was analysed and the factors were then categorised into four areas: *Agreed factors, Modified factors, Additional factors* and *Removed factors*. The responses received from every respondent were recorded based on their experiences and recommendations. Please see Appendix 6A (12.1) for a detailed presentation of comments received on technology factors in the preplanning stage.

a) Agreed factors

There were a number of factors discussed and agreed to by the participants with reference to their implementation experiences.

In regards to the factor 'business requirements identification', both LE1 and LE2 agreed that business requirements should be identified earlier in the implementation process, ideally being completed or started within the pre-planning stage. LE2 further added, based on practical experience that, *business process recording* started in the pre-planning stage. In this process the organisation's existing business processes are recorded ('*as is*') to compare with ERP application best practice processes ('*to be*') for the identification of business process 'gaps'.

Similarly, all small and midsize cases and SME implementer agreed on the importance of earlier identification of business participants and recommended that it should start in the pre-planning stage. All small and midsize case participants along with SME implementer

discussed the benefits of having ‘technical requirement analysis’ completed early (in pre-planning) (except for MID-2 who was unable to respond due to lack of experience).

Regarding the ‘technical requirement identification’ factor, MID-1 recommended keeping this factor in the pre-planning stage by noting that the statement of requirement for *current versus expected technical state* should be completed early in the process (for instance, software, hardware, and infrastructure requirements). SME implementer and others agreed to keep this factor in this early stage of the model, however, SME implementer was somewhat sceptical, stating that it would be difficult to establish a ‘requirement statement’ early, delivering the expected level of detail on current and the future states of the technical requirements for implementation.

The relevance and significance of ‘business and technology issues’ were evident from the discussion and LE2 stated that they experienced business functional and technology delivery related issues at the early stages of their implementation. Similarly, all small midsize businesses and SME implementer acknowledged experiencing business and technology issues in the early stages of implementation. SME implementer further argued that realistically the knowledge and understanding of these issues for a midsize business could hardly be halfway (fifty-fifty) in the early stages of implementation.

Generally these [midsize] businesses perform analysis of their current functionality and understand what they actually require. They identify the golden transactions period (the period between transactions and settlement dates), utilise use cases and map out their core business processes – at least at a higher level; they record the information such as what actually we do at the company etc. This helps them to identify their business functional issues and their potential technical solutions. This would be based on their level of maturity and realistically some midsize do this and some don’t (SME Implementer)

When questioned about ‘application understanding & usefulness’, LE2 acknowledged that the benefits of application were understood and usefulness analysis was performed in the early stage of implementation. It was further added that an analysis of existing applications/solutions was conducted in the pre-planning stage. Similarly SME implementer stated that generally midsize companies perform “use case” base analysis and shortlist solutions with some potential or relevance. This means that when companies perform use case analysis (as is recording of business processes) they outline their core business functions and try to find an *off the shelf* solution that mimics their core business functionalities (with or without

customisations). This argument was supported by the other small and midsize companies, who acknowledged the benefits of having an early analysis of relevant applications before a selection decision is made.

They [midsize businesses] generally remain focused on use cases testing on what they would actually like to have. Generally they do a bit of Internet assessment of the products as well and do their own short listing; comprising of what is in and what is out. (SME implementer)

When asked about 'impact of technology', LE2 noted the existence of this factor which relates to the effects of sophistication of the technical solution, enabling ERP functionality in an organisation. LE2 further added that the effects of technology impact were felt at very early stages of their implementation. Similarly MID-1, MID-2 and MID-3 agreed to have experienced impact of technology at very beginning of their implementation and endorsed to include it in pre-planning stage.

b) Modified factors

No technology factors were modified in the pre-planning stage.

c) Additional factors

Participants suggested that some factors should be moved from other stages and some new factors were recommended.

LE2 suggested moving the factor accurate information on ERP applications from the technology domain of the planning stage to the pre-planning stage. According to LE2 (Testing Manager, Large Enterprise), it would be important to have accurate information on ERP applications at the start of the process for decision making related to ERP application selection. This was also recommended by MID-1, who stated that having an early investigation would assist the organisation to select a suitable ERP application that matched their business model.

The higher level of information about ERP we had was refined in early pre-planning and we had to establish more accurate information from a higher to more detailed level before the project planning started. Based on our experience, this factor should be moved up from planning to pre-planning stage. (MID-1)

MID-1 also recommended moving the factors identify value stream for organisation and selection criteria with relevant parameters from the planning to the pre-planning stage. MID-1 was of the view that having an early understanding of value stream organisation; by analysing and mapping the processes for information and/or material flow, would help drive the implementation process conveniently, This will enable an organisation to remain in control of the implementation and capitalise the benefits of its preparedness. MID-1 realised the benefits of identifying value stream from the beginning of their implementation. MID-1 further added that having appropriate selection criteria with relevant parameters at the start helped them to select a suitable vendor. Hence, they suggested that every midsize organisation should consider having selection criteria clearly articulated with correct parameters.

We had selection criteria in pre-planning; containing key requirements questions before testing the market. (MID-1)

MID-2 suggested adding data migration in the pre-planning stage for optimal understanding of data migration, data cleansing and data translation requirements from the legacy system into the new application. They faced issues relating to data migration and conversion; therefore, it was advised for the benefit of midsize businesses to have data migration factor moved to the pre-planning stage.

I think it [Data Migration] should be considered at very early stages of implementation. We chose to manipulate the data in a format required to upload into the new application. It was good that we cleaned the data way before and got rid of the rubbish. We started the setup of our data migration process and had it ready for the implementation partner to upload. (MID-2)

In addition, MID-2 recommended moving data migration related factors to pre-planning stage as well including; 'early development of DC [Data Conversion] strategy' and 'strategy communication'. It was stated that the Data Conversion strategy should start and be completed at the start of the project and effectively communicated to the relevant parties for their feedback.

MID-3 suggested introducing a **new** factor called existing state to new, application analysis, which relates to having an ability to understand the organisation's new application functional requirements along with ability to envisage change from legacy to new functionality delivered by the ERP application. MID-3 argued that this factor should be included at the very early stage of the implementation. It was added that midsize businesses have limited access to

correct information on suitable ERP applications at the very start, hence conceptualising a future state would assist in enabling effective change management.

SME implementer suggested adding a **new** factor called integration requirements in the pre-planning stage. This related to identification of the integration/ interface requirements for the new application with other internal/external applications at an early stage. This would enable midsize businesses to streamline their technical design details appropriately.

d) Removed factors

LE2 suggested moving two factors, 'Technical requirements analysis' and 'Technical requirement identification' from the pre-planning stage to the planning stage. LE2 was a Testing Manager with little insight on technical matters suggested moving these factors as the identification of technical requirements cannot be done at that early stage of implementation.

6.4.1.2 Section summary

For the most part the interviewees endorsed the factors listed in the Technology domain of the pre-planning stage. Some other factors were suggested to be added, primarily by midsize businesses and the SME implementer. Due to the relevance of proposed changes suggested by interviewees and the arguments provided: the added factors were accurate information on ERP applications (proposed by LE2), identify value stream for organisation and selection criteria with relevant parameters (proposed by MID-1). Furthermore, appreciating the significance of the data migration based on reported experiences, relevant factors such as prepare for data migration and sub-factors, early development of strategy and strategy communication were also included. Two **new** factors proposed by MID-3 and SME implementer were also added: existing state to new application analysis and integration requirements. The revised model for the Pre-Planning stage will be shown at the end of this section.

6.4.1.3 Organisational factors

At the conclusion of the first data collection phase analysis, the organisational factors in Pre-Planning stage comprised:

- Organisational Knowledge
 - Business functional knowledge
- Develop Strong business case
- Cross organisational business functions

- Organisational Political support
- Change and Risk Analysis;
- Stakeholder expectation Analysis;
- Strategic Management Issues;
- External Organisational factors
- Macro environmental factors

As indicated earlier, there were two interviews conducted at the large size case organisation; the first being the pilot interview with the Technical resource manager (LE1) and the second with the Testing Manager (LE2). Furthermore, interviews were conducted with three midsize businesses (MID-1, MID-2 and MID-3), one small size (SME) and one SME implementer. The feedback received from each interview was categorised into four groups: *Agreed*, *Modified*, *Additional* and *Removed* factors. See Appendix 6A (12.1) for a detailed reflection on comments received.

a) Agreed factors

LE2 acknowledged the benefits of Organisational Knowledge existence in the pre-planning stage for better understanding of organisational requirements before project inception. Similarly, all small and midsize business and the SME implementer interviewees acknowledged the benefits of organisational knowledge and MID-1 recommended having an early mechanism to record organisational knowledge effectively. In regards to business functional knowledge gathering; LE2 experienced this factor in the early stages of implementation and recommended it to be included in the pre-planning stage. MID-1 also emphasised the need for clearly defined objectives of what the organisation required from ERP implementation:

We performed a detailed review of what we wanted then, providing a comprehensive documentation to the reseller/ implementation partner for their knowledge and consideration. (MID-1)

Similarly, SME implementer expressed a need to capture Business process knowledge of the organisation's key business functions, as this information would be required to design or configure ERP applications. Likewise, SME and MID-3 supported the need for business functional knowledge. MID-3 also recommended a need for 'organisational knowledge' illustration and advised having a clearly defined business strategy and core objectives for the ERP implementation. MID-3 also argued to establish a broad agenda or business benefit roadmap for the small-midsize businesses containing a clearly defined organisational strategy.

[The] next step after requirement gathering could be a Business matrix. We need to be clear about the size and number of staff required to use the end product. This will enable small and midsize businesses to baseline [bear minimum expectation] the type, size and nature of product that should facilitate their business needs. (MID-3)

In regards to developing a strong business case, LE2 acknowledged the need for a strong business case development in the pre-planning stage, as this would help to justify the need for the project. Likewise, all small and midsize business interviewees along with SME implementer favoured having an early development of business case for project justification. MID-1 and MID-3 stated that even though having a strong business case is relevant with known benefits, it may be even more relevant to a larger organisation having at least or more than 250 staff. This means that small and midsize businesses understand and appreciate the significance of business case but are inclined to develop a simplified rather a complex case. MID-2 and SME also acknowledged the benefits of having a strong business case but in their experience they did not develop one.

Business case was simplified in our case as an urgent need was there already, so we knew what we had to do. Generally there are multiple layers of management in public sector or large organisations requiring sign off etc. but in our case we identified the need and when we knew we had to do it we just did (MID-1).

Small businesses struggle with the development of business case. This is something that they should do but they don't always do well. Establishment of a strong business case is important. Analysis of the current state of the business and future state is important, along with clearly defining needs. (MID-3)

When asked about the Organisational political support factor in the pre-planning stage, LE2 suggested that it was important for them to have political support at an organisational level. This provided the project a firm commitment from senior management and this commitment played a vital role in the success of both ERP projects (PeopleSoft Campus Solution and PeopleSoft Financials). Similarly, all small and midsize case interviewees and the SME implementer endorsed the existence and benefits of having organisational political support at very start of the project. It was important to note that in case of all small-midsize business, mostly one senior management person was responsible for their implementation or directly lead the activities (due to a simplified management hierarchy). For instance, in case of MID-1 the interviewee was the Chief Operating Officer and the business sponsor and was also responsible for the project implementation. The pattern remained the same for other small and

midsize case organisations. Apart from MID-2, all of the small and midsize interviewees endorsed the factor cross organisational business functions in the pre-planning stage. It was suggested that organisational business functions would be critical throughout the implementation process and midsize companies should analyse this in the early stages of implementation. In response to the factor “change and risk analysis” requirements in pre-planning stage, LE2 stated that change and risk analysis are critical components of the project management and should be considered in the early stages of implementation. Similarly MID-1, MID-2 and MID-3 agreed to have experienced change and risk analysis at the start of their implementations and endorsed its position in the pre-planning stage.

Similarly, LE2 responded positively to the factor strategic management issues and external organisational factors, while agreeing to have these factors included in the pre-planning stage, even though they did not consider them in their own implementation. Likewise, MID-1, MID-2 and MID-3 acknowledge the existence of strategic management issues and highlighted the need to have these issues analysed earlier in the project. MID-1 and SME also indicated the significance of strategic management issues and stated that these issues are important, specifically in terms of growth and maintenance issues with the legacy applications. Furthermore, MID-2 emphasised the significance of external organisational factors in relation to performing reference checks of the available solution already implemented in the similar organisations. MID-1 suggested the need to establish an audit of the project for quality assurance in delivery. MID-1 acknowledged the significance of macro environmental factors and supported its inclusion in the early stages of the model.

b) Modified factors

MID-3 suggested a change in factor stakeholder expectation analysis to stakeholder engagement plan. MID-3 was of the view that rather simply conducting an analysis of expectations, it would be important to have a clearly articulated plan drafted in the pre-planning stage that could later be followed whilst recording the expectations of stakeholders.

Stakeholder engagement plan should include the identification and management of stakeholders, a need to be clear about the stakeholders, who they are and how will they be engaged during the entire implementation. With ERP you will be crossing the business lines (such as sales processes, procurements and actual operational aspects). Therefore, you will have multiple business stakeholders. Make sure you know who is the initiative owner and the business owner and who has the accountability or project ownership. (MID-3)

MID-3 further argued that it is important to understand the business dimension and how many resources a business department or function could free up for implementation assistance. These decisions should be outlined within project business case.

c) Additional factors

LE2 suggested adding/ relocating factors in the organisation domain of the pre-planning stage such as effective communication strategy (based on who what when how), effective technique for communication such as survey and executive management commitment from planning to the pre-planning stage. LE2 argued that the communication strategy was developed in the planning stage but it would be ideal to have it completed in pre-planning. Hence, it was recommended to consider moving this factor within proposed model presentation. Similarly, LE2 argued that a survey in the planning stage could help contact stakeholders for project related information. However, if this was actioned in pre-planning, it would be more beneficial. In contrast, MID-3 argued otherwise and stated:

*Pre-planning stage relates to **decisions leading up to product selection**. Communication and communication strategy occur a bit later in the stages of implementation (MID-3).*

LE2 also stated that executive management commitment for a project is critical and having this committed even before project initiation would help the project initiate and execute successfully. Therefore, it was recommended to move the executive management commitment factor from planning to the pre-planning stage.

MID-3 suggested adding **new** factors in the organisation domain of the pre-planning stage, such as. Budget estimates (tentative dollar figures). It was argued that a high level estimate of the project should be completed at an early stage of implementation to clearly articulate and understand the project's budgetary requirements. MID-3 further suggested adding a 'business objective and direction' factor that should lead into establishment of a business strategy. It was argued that until there is a clear definition of business objectives and direction, it would be difficult to complete requirements for ERP implementation. Hence, this factor should be included in the pre-planning stage of the model.

d) Removed factors

It was suggested by LE2 to remove factor 'cross organisational business functions' from pre-planning and relocate it to the Planning stage.

All factors presented under the organisational domain of pre-planning should stay, except cross organisational functions as it was done later in the planning stage. Pre-planning is too early to consider this factor. (LE2)

LE2 further added that the factor 'stakeholder expectation analysis' could not be done in isolation and would require a thorough interactive analysis of stakeholder expectations. It can only be carried out during the requirements gathering and/or fit gap analysis phases (Blue print/Build stage); hence, this factor should be moved later to the Design/Build phase. According to LE-2,

“Stakeholder expectation should be done upfront but [I am] not sure how it was done for both the Campus and Finance projects. It was not successful as it could have been and should be in the pre-planning [stage]”. (LE2)

Similarly, **SME-implementer** suggested moving some factors from pre-planning to the planning stage. It was argued that for midsize business, it is too early to understand, appreciate and acknowledge such critical aspects of the implementation in pre-planning. Factors such as 'change and risk analysis', 'stakeholder expectation analysis', 'strategic management issues', 'external organisational factors' and 'macro environmental factors' should be moved later to the planning stage. SME implementer stated:

Change and risk analysis in pre-planning stage is too early where it is difficult to realise the benefits. Move it down to planning stage.

Stakeholder expectation analysis or having a clue about what stakeholders actually want is not possible at this early stage. The process starts in planning and continues all the way through the implementation. There should be acknowledgment that the stakeholders support would be crucial for the project success. Otherwise, the project could go pear-shaped.

Strategic management issues and overall impact of the application on organisation could not be determined or known in the pre-planning stage. Probably we could consider this factor in the planning stage.

External organisational factors should not be in pre-planning and are more relevant to planning or even later stages of implementation. Pre-planning is too early for external factor analysis.

Macro environmental factors like being in recession etc.; this would be relevant to the planning stage as well. If an organisation has money to spend and wants to implement a product, this factor won't matter much for them in the pre-planning stage.

6.4.1.4 Section summary

Based on the above discussion, it can be concluded that apart from SME implementer and LE2, recommendations to move some of the factors from pre-planning to planning stage, the rest of the participants did acknowledge the significance and relevance of the factors identified. It is therefore concluded that all factors except strategic management issues, external organisational factors and macro environmental factors will remain in the pre-planning stage. The above three factors are removed on the basis that a valid argument was provided by SME implementer and MID-1 while, MID-2 and SME remained confused about the differences amongst the pre-planning and planning stages of their implementation. These factors are relevant and should be included in the model but based on SME implementer's experience, these are more relevant to the planning stage. Furthermore, based on MID-3 feedback, the factor stakeholder expectation analysis is modified to be stakeholder engagement plan, as it is more relevant and critical for the implementation preparedness. In addition, based on LE2 suggestions, the communication related factors have been moved from the planning stage to the pre-planning stage. Two new factors suggested by MID-3 are added in the list: budget estimates and business objective and direction. These additions were made based on the arguments provided by each of the participants and it is perceived that adding these factors in the pre-planning stage would bring value to the model composition.

6.4.1.5 People factors

The People factors section of the model in the pre-planning stage comprised:

- Limited resources (Skills)
- Communication Strategies
- Conflict resolution procedures

See Appendix 6A (12.1) for a detailed reflection on comments received in regards to People factors in pre-planning stage.

a) Agreed factors

LE2 considered 'Limited resource (skills)' to be an important factor and recommended that it remain in the pre-planning stage.

In response to limited resources and resource planning, I think all of them should remain in the pre-planning stage and identified upfront in the project. I cannot comment on whether it was done in our implementation or not but I consider these important. I think, [project staff] positions were planned at a higher level at the start (unsure if it was pre-planning or planning) and later advertised for hiring on the project.

MID-3 argued that rather than having the 'limited resources (skills)' factor at the early stages of the model, it would be more practical to clearly articulate the resource (people/skill) requirements for the project. Similarly, SME implementer was of the view that resourcing (skill) would remain to be a challenge for small-midsize businesses.

MID-2 and SME considered 'conflict resolution procedure' to be irrelevant due to the limited size and scale of their implementation however did acknowledge experiencing 'limited resource (skills)' in the pre-planning stage. It was further added that the third party implementation partner provided expert staff for their implementation to bridge the resource (skill) gap. MID-2 also stated that the effectiveness of 'communication strategies' was "phenomenal" due to the diverse range of (internal and external) stakeholders involved in their implementation. LE2 argued the benefits of developing a high level communication strategy at the start of project; therefore, the factor should remain in the pre-planning stage.

b) Modified factors

No modifications were proposed to existing factors.

c) Additional factors

SME implementer proposed a list of **new** people factors for inclusion in the pre-planning stage: what ERP will do for people, Business case foundations – people impact, Efficiency brought by ERP to people, Return on investment (ROI), process improvement and conflict existence. SME implementer was of the view that for small and midsize businesses, it is important to have clear understanding of ERP application benefits, an understanding of their requirements, the benefit they wish to drive in terms of functional efficiencies and the return on investment expectations. It was further argued that due to the size and limited operations

of midsize businesses, their expectations and response to achieving expected targets might be different. Therefore, it is important for such businesses to clearly understand and articulate their requirements and have an understanding of what process would be improved. Furthermore, before establishing a conflict resolution procedure, there has to be a way to know whether a conflict exists. Hence the SME implementer suggested moving the factor conflict existence to the planning stage.

MID-3 also suggested **new** factors relating to resource management: 'business demonstration – resource size and skills', 'resource management plan - comprising of resource backfill planning by business (an ability to transfer skilled business staff to the project and hire temporary personal to manage day to day operations) and project resource size planning (the type, nature and skill of each person on the project team). MID-3 was of the view that it would be worth investing time on clarifying the resource (staff skill) base of the business and how much could they commit to the project in the People domain of the pre-planning stage. It was recommended to establish a resource management plan (comprising resource backfill, the project resource size and so forth).

d) Removed factors

LE2 suggested moving the factor conflict resolution procedure from pre-planning to the planning stage. It was argued that it would be too early in pre-planning to discuss or establish a conflict resolution strategy. LE2 stated:

[Conflict resolution procedure] was not done based on our experience but I think it should be done at the very start of the planning stage (LE2).

Similarly, SME implementer and MID-3 suggested moving the factors communication strategies and conflict resolution procedure later to the planning stage. SME implementer argued that the communication plan should be later in the planning stage, as pre-planning is too early to establish communication strategy. Limited resources (staff skills) are indeed relevant to People factors but the information on what resources will be allocated to the project and who will continue with operational responsibilities; is more relevant to the planning stage. Furthermore, establishing a communication strategy is relevant to the planning stage, as in pre-planning the initial focus should be on identification of stakeholders rather developing communication strategy (SME implementer).

Recommendation: *In people factors you should consider [during pre-planning stage]: What would it do to the people working for my organisation? Start the foundations of the business case. If we implement an ERP system (let's say financial), we may reduce the number of our accounting staff from six to two. These sorts of things should be considered, not at the detail level but at least start to talk about them. Overall, what would we get out of this implementation and what benefits would this bring? Questions to know such as: Are we going to move things faster or build things quicker? Are we going to get money faster, a better return on investment? It is all about improving the way of doing business and achieving better ROI which doesn't have to be money always. Midsize business should always consider these questions before going ahead with implementation (SME Implementer).*

6.4.1.6 Section summary

Based on above discussion, it can be concluded that two factors: limited resources (skills) and conflict resolution procedures, should be moved to later stages or absorbed within other factors. For instance, MID-3 suggested adding a **new** factor Resource Management plan and due to relevance, limited resources (skills) could be relocated within that.

Even though SME implementer argued against having communication strategy in pre-planning stage, the researcher believes it would be beneficial for midsize business to have communication strategy drafted with clear visibility of stakeholders in pre-planning stage based on other responses.

There were a number of **new** factors suggested by MID-3 and SME implementer. These factors are included in the people domain of pre-planning stage due to their relevance and valid arguments provided by the experts. For instance, it would be beneficial if midsize business demonstrates their resource size and skill before starting the project. Establishing a resource management plan will enable business and the implementation partner to identify resource (staff/skill) size and plan for additional resources to meet the project demand. Due to the limited size and scale of operations, it is important for a midsize business to identify key staff members to be allocated for the project and hire temporary staff (back fill) to assist with day to day operational responsibilities. Hence, the **new** factors: project resource size planning (type, nature and skill) and resource backfill planning by business are included. Furthermore, SME implementer argued in favour of analysing what ERP will do to people, along with other factors such as, business case foundations (people impact), efficiency brought by ERP to people, Return on investment (ROI), process improvement, and finally conflict existence.

These are all included in the model as they are relevant and would be beneficial for midsize businesses to consider in the early stages of ERP implementation.

6.4.2 Summary of Pre-planning discussion

Table 6.3 shows the revised Pre-Planning stage after the analysis of case study interviews. Altered factors are represented in the middle column as follows:

- ~~Text removed~~
- Text added.

The final column shows the amended stage after the case study analysis.

Table 6.3: Pre-Planning stage amended after case study analysis

Domains	Pre-planning Stage (Before Case Study)	(New Factors or changes as recommended)	Pre-planning Stage (After Case Study Analysis)
Technology Factors	<ul style="list-style-type: none"> • Business requirements identification <ul style="list-style-type: none"> ◦ <i>Technical requirements analysis</i> • Technical requirements identification • Business & Technology Issues; • Application understanding & usefulness • Impact of technology 	<ul style="list-style-type: none"> • <i>Integration requirements</i> • <i>Accurate information on ERP applications</i> • <i>Identify value stream for organisation</i> • <i>Selection criteria with relevant parameters</i> • <i>Accurate information on ERP applications</i> • <i>Data migration</i> <ul style="list-style-type: none"> ❖ <i>Early development of strategy</i> ❖ <i>Strategy Communication</i> • <i>Existing state -> new application (legacy to new change)</i> 	<ul style="list-style-type: none"> • Business requirements identification <ul style="list-style-type: none"> ◦ <i>Technical requirements analysis</i> • Technical requirements identification • Business & Technology Issues; • Application understanding & usefulness • Impact of technology • <i>Accurate information on ERP applications</i> • <i>Identify value stream for organisation</i> • <i>Selection criteria with relevant parameters</i> • <i>Prepare for Data migration</i> <ul style="list-style-type: none"> ◦ <i>Early development of strategy</i> ◦ <i>Strategy Communication</i> • <i>Existing state to new application analysis (legacy to new change)</i> • <i>Integration requirements</i>
Organisational Factors	<ul style="list-style-type: none"> • Organisational Knowledge <ul style="list-style-type: none"> ◦ <i>Business functional knowledge</i> • Develop Strong business case • Cross organisational business functions • Organisational Political support • <i>Change and Risk Analysis;</i> • <i>Stakeholder expectation Analysis;</i> • <i>Strategic Management Issues;</i> • External Organisational factors • Macro environmental factors 	<ul style="list-style-type: none"> • <i>Effective Communication strategy (based on who what when how)</i> • <i>Effective technique for communication such as survey</i> • <i>Executive Management Commitment (clearly present)</i> • <i>Budget Estimates (tentative dollar figures)</i> • <i>Stakeholder expectation Analysis; engagement plan</i> • <i>Business Objective and direction -> Business strategy</i> 	<ul style="list-style-type: none"> • Organisational Knowledge <ul style="list-style-type: none"> ◦ <i>Business functional knowledge</i> • Develop Strong business case • Cross organisational business functions • Organisational Political support • <i>Change and Risk Analysis;</i> • <i>Stakeholder expectation Analysis; engagement plan</i> • <i>Strategic Management Issues;</i> • <i>External Organisational factors</i> • <i>Macro environmental factors</i> • <i>Effective Communication strategy (based on who what when how)</i> • <i>Effective technique for communication such as survey</i> • <i>Executive Management Commitment</i> • <i>Budget Estimates (tentative dollar figures)</i> • <i>Business Objective and direction -> Business strategy</i>
People Factors	<ul style="list-style-type: none"> • Limited resources (Skills) • Communication Strategies • Conflict resolution procedures 	<ul style="list-style-type: none"> • <i>Business demonstration – resource size and skills</i> • <i>Resource Management Plan</i> <ul style="list-style-type: none"> ◦ <i>Resource backfill planning by business</i> ◦ <i>Project Resource size Planning (type nature skill)</i> ◦ <i>Identify limited resources (Skills)</i> • <i>What ERP will do to people</i> • <i>Business case foundations – people impact</i> • <i>Efficiency brought by ERP to people</i> • <i>Return on investment (ROI)</i> • <i>Processes improvement</i> • <i>Conflict existence</i> 	<ul style="list-style-type: none"> • Limited resources (Skills) • Communication Strategies • Conflict resolution procedures • <i>Business demonstration – resource size and skills</i> • <i>Resource Management Plan</i> <ul style="list-style-type: none"> ◦ <i>Resource backfill planning by business</i> ◦ <i>Project resource size planning (type nature skill)</i> ◦ <i>Identify limited resources (Skills)</i> ◦ <i>What ERP will do to people</i> • <i>Business case foundations ,people impact</i> • <i>Efficiency brought by ERP to people</i> • <i>Return on investment (ROI)</i> • <i>Processes improvement</i> • <i>Conflict existence</i>

6.4.3 Planning stage

Table 6.4 presents the factors associated with the planning stage of ERP implementation, categorised in the Technology, Organisational and People domains. The stage content below was as presented at the end of the first data collection phase. At the end of this discussion, a revised version of planning stage is presented.

Table 6.4: Planning stage factors before case study analysis

Factors for ERP adoption	Planning stage
Technology factors	<ul style="list-style-type: none"> • Selection criteria with relevant parameters • Accurate information on ERP applications • Less reliance on sales advice • Time & Cost of implementation • New technology adoption issues • Industry standards • Proposed application System architecture analysis • Technical staff/consultant expertise • Realistic “end user” expectation analysis (Minimal or no customisations) • Identify value stream for organisation
Organisational factors	<ul style="list-style-type: none"> • Cultural factors (local, national) • Government or regulatory change • External environmental factors • <u>Project Management:</u> <ul style="list-style-type: none"> ○ Detailed project plan & communication strategy ○ Project Leadership (risk & issues) ○ Clear & well defined objectives (Scope) ○ Organisational change management ○ Risk Planning & Monitoring; ○ Effective Communication strategy, based on “who, what, when and how” ○ Effectiveness techniques for communication (survey) ○ Limited Resources (Budget) • Executive Management Commitment • Business impact analysis, • Definition of individual and collective benefits
People factors	<ul style="list-style-type: none"> • User support base for application • Limited resources (people/skill) • Effective time management • Change Management; • Clarity in Communication • Team Building • Team Competence • Training strategies • Incentives with deliverables.

6.4.3.1 Technology factors

The Technology domain factors in the planning stage comprise:

- Selection criteria with relevant parameters
- Accurate information on ERP applications
- Less reliance on sales advice
- Time & Cost of implementation
- New technology adoption issues
- Industry standards
- Proposed application System architecture analysis
- Technical staff/consultant expertise
- Realistic 'end user' expectation analysis (Minimal or no customisations)
- Identify value stream for organisation

When the Technology domain factors in planning stage were discussed, both large size business interviewees (*LE1 and LE2*) acknowledged that they were generally aligned with their experiences and small and midsize interviewees (*MID-1, MID-2, SME, MID-3*) and SME implementer gave feedback based on their experiences and knowledge of the implementation. Please see Appendix 6B (12.2) for a detailed presentation of comments received.

a. Agreed factors

There were a number of Technology factors discussed and agreed to by participants.

In relation to the factor 'selection criteria with relevant parameters', both LE1 and LE2 agreed with the significance and occurrence of this factor. LE1 argued that their organisation had its procurement policy and procedures and they were used to select a suitable ERP application. LE2 supported the argument and emphasised the significance of a requirements based tender that should clearly articulate the business expectations to vendors before they submit their tender responses. Similarly, small and midsize business interviewees: MID-2, SME, MID-3 and SME implementer acknowledged its importance and argued in the favour of having selection criteria with relevant parameters for ERP vendor and services partner selection. MID-2 further added that in their experience an online product demonstration was used to facilitate the selection decision. SME implementer highlighted the benefits of engaging with a partner while selecting ERP products and also during ERP implementation. MID-3 added that business critical opinions such as functional, technology and vendor support availability were some of the parameters that they considered to be important. In addition, some key steps MID-3 considered while selecting an ERP vendor were, importance of rating process and shortlisting of the participants along with business scenario testing of every available solution.

In contrast to others, MID-1 suggested moving this factor to an earlier stage due to its significance for the project success.

Similarly, when asked about the factor 'accurate information on ERP applications' (based on market references), LE1 and MID-3 acknowledged the relevance of having accurate information availability, while LE1 argued conducting market surveys, reference checks or site visits to confirm vendor expectation claims. LE1 further added that they used this strategy in their implementation. Likewise, SME, SME implementer and MID-2 also recommended keeping this factor in the planning stage while LE2 and MID-1 suggested moving it to pre-planning, as obtaining information might be more useful before project inception. SME implementer's response was sceptical, stated;

*Regarding accurate information on ERP applications, I would say it is important and should be considered in the planning stage but **good luck with that**. I am saying good luck as it would be difficult to obtain correct information until you have engaged with a partner. The only thing a midsize company has to rely on would be product brochures etc. It is unlikely that vendors would tell [midsize] companies the truth about their product. Basically, all products do exactly the same stuff and having a lot of business cases side by side, the vendors tend to respond in similar fashion (SME implementer).*

When asked about 'less reliance on sales advice', all midsize, large size and SME implementer recommended keeping this factor in the planning stage. MID-1 stated that they relied on sales advice due to lack of product knowledge and expertise in ERP implementation but they did ask for proof of concept demonstrations (*demo presentations provided by the vendor/reseller*).

In terms of reliance on sales advice, we did rely (on them) heavily but also had a proof of concept demonstration done (MID-1).

MID-1 suggested that it would be better if other midsize businesses not rely on sales advice and performed a realistic independent assessment. Similarly, SME implementer suggested midsize businesses to not rely on sales advice but also to perform an independent need based analysis.

Regarding, the factor 'time & cost of implementation'; SME, MID-1 and large enterprise participants acknowledged its relevance and endorsed it to be included in the planning stage, while MID-3 related this factor with the response provided by vendor on implementation

estimates (dollar value to implementation). LE1 added that an estimate of overall time and cost of implementation should be completed in the planning stage of implementation.

In response to the factor 'new technology adoption issues': LE2, SME implementer and small midsize case participants endorsed it to be included in the planning stage. SME implementer related this factor to opportunities such as mobility, higher availability (HA), complexity, network, servers, PCs and other ICT infrastructure adoption issues that are necessary for the implementation. MID-2 related this factor with learning trial balance in their implementation and SME recommended having an early analysis of the technical requirements for an early identification of issues. SME implementer made some recommendations for small and midsize companies:

In Technology factors, they must consider required technology infrastructure to host the product [ERP application], the bandwidth [connectivity] requirements, the support to the technology, the PCs, Laptops to run the gear and so forth. Also consider mobility, high availability and a whole a lot of questions that need to be answered to address these technology questions. Regarding decision point, small midsize companies have to go through mostly the opportunities for the project. They should get the technology right and also related decisions made in planning (SME implementer).

In regards to the industry standards factor, LE1 and LE2 recognised its relevance and stated that this factor relates to ERP implementation standards. SME, MID-3 and SME implementer also recommended this factor to be considered from the planning stage onwards throughout the implementation. SME implementer stated:

In relation to common industry standards; I would say there are none. If you are an educational institution you might pick up some of these but for private businesses these are irrelevant. I don't think a lot of people think about these, especially small midsize companies. Government standard you may not need to apply within the application but you may have to comply with them in your implementation (SME implementer).

Both large size interviewees acknowledged the relevance of the 'proposed application system architecture analysis' factor but in their experience this analysis was not performed:

In regards to the application architecture analysis question, I think it should happen in the planning stage. Any future goals and what is to happen should be considered. I don't think it was done in our implementation though. Indeed, Oracle implemented

PeopleSoft Financials and Campus Solutions and pushed for HCM (HRMS) [Human Capital Management] system. For us, it was pure luck that it ended up the way it has been and we ended up selecting the product based on its functionality and not the technical architecture (LE-2).

Similarly, small midsize case interviewees and the SME implementer also acknowledged the relevance of this factor and recommended it to be included in the planning stage. Furthermore, all case study representatives including large, small and midsize and SME implementer agreed to keep the 'technical staff/consultant expertise' factor in the planning stage.

According to the large business case participants, 'realistic end user expectation analysis' and 'identify value stream for organisations' factors should start with the requirements gathering phase and continue through fit-gap analysis. LE1 further argued that only a higher level analysis would be possible in the planning stage while additional details could be realised in the later stages of implementation. Likewise, small and midsize case participants acknowledged the benefits of these factors, while SME implementer added that it would be premature to have reliable information on end user/stakeholder expectations as well as on the value stream for the organisation. The SME implementer comment was similar to the comments made by large size participants in relation to having high level information availability about end user expectations and value stream for the organisation in the planning stage.

b. Modified factors

No modifications were proposed in the existing factors.

c. Additional factors

LE2 suggested adding technical requirements identification and technical requirements analysis factors from pre-planning to the planning stage. LE2 argued regardless of their practical experience, technical requirements identification and analysis would always be beneficial for businesses. It was further added that the technical requirement analysis should start with a technical identification in the pre-planning stage and be completed in the planning stage. LE2 added that it is important for businesses to have high level insight on potential solutions and their technical requirements including hardware and infrastructure. Similarly, SME implementer suggested moving define compatibility issues with other applications and ERP complexity management planning factors from the build to the planning stage. It was

argued that while planning for the implementation, it would be useful to know the compatibility requirements and the number of application interfaces required to function appropriately.

LE2, MID-1 and SME implementer suggested moving data migration related factors to the planning stage. MID-1 and LE2 further added that Data Migration strategy development and Data migration strategy communication and feedback should also be moved into the planning stage while SME implementer argued that Establish Data migration Strategy and Data validation, verification and cleansing factors should be moved from the construction stage to the planning stage. These recommendations were made based on a perception that planning for data migration and development of a migration strategy should happen early in the implementation process for optimal control over data conversion and for an effective legacy system data management. The participants (LE2, MID-1 and SME implementer) reiterated the same message of not leaving critical decisions for later consideration. For instance:

We should have an early planning and development of data migration strategy at the very early stages of the implementation. This is to identify critical information such as what kind of data we are dealing with. I don't expect this to be detailed but a high level only. (LE2)

LE2 argued that the data migration strategy should contain information on data translation, extraction, validation and how the data would be migrated. The strategy should clearly articulate how data migration processes will work. Furthermore, LE2 stated that the actual data cleansing and process development starts in the build stage and continues through the construct stage. There are a number of data conversion runs required to be completed for process optimisation and validation.

LE2 also suggested adding a **new** factor, a decision on testing tools – Quality Centre (QC) and setting up of quality management and quality assurance protocols. Furthermore, LE2 suggested another new factor called plan for testing and identify tools required for testing such as Quality Centre (QC). LE2, (being the Testing Manager for the implementation) emphasised test processes, planning and a need for testing tools and techniques for the project in the planning stage. LE2 also acknowledged that in the planning stage, only high level information would be available:

I suggest the organisation should consider developing a testing plan earlier in the implementation. This plan should contain a high level strategy for test scripts, test cases development along with ways to translate functional design documents (FDDs)

into test documents. The test documents would further improve during system testing and user acceptance testing (UAT). All this happened in our project and testing related documents were handed over to the operations. Similarly, I think identification and decision making on Testing Tools should happen in the planning stage. What are you using and what will be used for implementation and development of Test plan should be done within the planning stage. (LE-2)

MID-1 suggested a **new** factor: planning decisions should be made to add in the planning stage. This means, while starting the project, all critical decisions and direction for the project is set appropriately to avoid any unexpected surprises. SME implementer also suggested a new factor, 'engage with partner' in the planning stage and argued that it would be beneficial for midsize business to engage with an experienced partner to help them through the implementation. SME implementer also suggested creating a sub-stage within the planning stage towards the end and should contain factors that need to be completed in planning but before the next "design" stage. SME implementer suggested some **new** factors that should be included in this sub-stage establish infrastructure strategy with technology requirements and establish application integration strategy. Similarly, MID-1 argued that application integration related factors including sub-factor Identify systems for integration should be moved from the construction stage to the planning stage. SME implementer recommended transferring identify applications for integration from the construction stage to the planning stage. SME implementer argued that the planning related decisions, regardless of their nature (*compatibility or complexity or application integration*) should be discussed and planned in or towards the end of the planning process. MID-2 argued that time and cost of implementation should contain the software cost and must be confirmed before the end of the planning stage.

d. Removed factors

Case study participants suggested removing some Technology factors of the planning stage. For instance, LE1 suggested removing the factor new technology adoption issues from the planning stage to the build stage and argued that it would be too early to understand and appreciate the technology adoption issues in the earlier stages of the project. When asked whether LE1 envisaged any technology adoption issues in planning, the response was no. However, it was stated that they decided on the product based on their preferred vendor.

MID-1 suggested removing the selection criteria with relevant parameters and accurate information on ERP applications factors from the planning stage and move these to the pre-

planning stage. As discussed earlier in the pre-planning stage, MID-1 recommended these changes based on experience and argued the significance of the product selection process;

In terms of selection criteria for product selection and accurate information on ERP, we did that in pre-planning stage. We were able to establish some key requirements based questions. We started from higher level details first and then gathered detailed information on what was required clearly articulated (MID-1).

MID-1 suggested that it would be beneficial to have the identification value stream for organisation factor moved to the pre-planning stage. It was argued that they “pretty much knew” what they wanted in the planning stage and that was because they were able to identify the value stream in pre-planning. Similarly LE1 and LE2 stated that the process of identification of value stream carries on throughout design and build stages of implementation. SME implementer suggested moving the factors realistic end user expectation analysis and identifying value stream for organisation from the technology domain to other domain classifications in the model. According to SME implementer,

‘Realistic end user expectations’ is not related to the technology factor, rather associated to organisational or may be due to the ‘end users part’, a people factor. It is important to know what end users are expecting out of the implementation. People who are over 60 generally tend to like MS Excel more to work on so what would they expect? (SME implementer)

Regarding your ‘value stream’ question, I think companies tend not to do all that, even though they talk about it. I believe this is also an organisational rather than a technology factor (SME implementer).

6.4.3.2 Section summary

Based on the discussion above, it can be concluded that most of the factors were accepted by case study participants and some alterations were suggested. The pre-identified factors such as ‘selection criteria with relevant parameters’, ‘less reliance on sales advice’, ‘new technology adoption issues including’ (*Mobility, HA, Complexity, network*), ‘industry standards’, ‘proposed application system architecture analysis’, ‘technical staff/consultant expertise’ and ‘time and cost of implementation’ remain unchanged.

Based on LE2 and MID-1 suggestions, accurate information on ERP applications is moved from planning to pre-planning stage because it would be beneficial to have early identification

and baseline work in the preparatory stages. Similarly SME implementer recommended that the factor 'realistic end user expectation analysis' be moved from the Technology to the People domain. Large size participants and SME implementer argued that end user expectation could not be clearly defined until requirements gathering and designing phases are complete. Therefore, this factor can be considered in the planning stage and revised based on additional information from the design stage. Additionally, SME implementer suggested moving identify value stream for organisation to the organisational domain. In addition, based on MID-1 recommendation, the value stream factor is also added in the pre-planning stage for earlier analysis. Although LE1 suggested removing new technology adoption issues factor from the planning stage, the arguments provided by SME implementer in favour of keeping this factor in planning were valid. In addition, SME implementer suggesting considering other components within new technology adoption including: mobility, higher availability, complexity, network, servers, PCs and other ICT infrastructure required.

There were *new* factors suggested by a range of different experts including, 'technical requirements identification and analysis', 'plan for testing - *Decide on Testing Tools– QC* (QA, QM protocols set), 'engage with technical stakeholders', 'identify applications for integration', 'compatibility issues with other applications', 'establish infrastructure strategy – *technology requirements*', 'establish application integration strategy' - Identify systems for integration, 'establish data migration strategy' - *strategy communication* and 'data validation', 'verification and cleansing'. Based on recommendations and arguments provided by experts and their relevant to the technology domain of planning stage, the researcher has included them in the model.

6.4.3.3 Organisational factors

At the conclusion of the first data collection stage the Organisational factors were:

- Cultural factors (local, national)
- Government or regularity change
- External environmental factors
- Project Management;
 - Detailed project plan & communication strategy
 - Project Leadership (risk & issues)
 - Clear & well defined objectives (Scope)
 - Organisational change management
 - Risk Planning & Monitoring;

- Effective Communication strategy, based on ‘who, what, when and how’
- Effectiveness techniques for communication (survey)
- Limited Resources (Budget)
- Executive Management Commitment
- Business impact analysis,
- Definition of individual and collective benefits

While discussing these factors within Organisational domain of “Planning stage”, both large size business interviewees (*LE1 and LE2*) acknowledged their relevance and small and midsize case study interviewees (*MID-1, MID-2, SME, MID-3, SME Implementer*) discussed them based on their experiences. Please refer to Appendix 6B (12.2) for a detailed reflection on comments received in relation to the organisational factors in the Build stage.

a. Agreed factors

Most of the participants acknowledged the relevance of factors presented in the organisational domain. In response to the ‘cultural factors (local, national)’ factor both large-size (Dual Sector University) interviewees recognised experiencing cultural issues due offshoring some of their development work. It was argued that cultural factors become relevant when staff from different regions or nationalities work together, specifically staff with different cultural backgrounds. Similarly MID-3 acknowledged experiencing ‘cultural factors’ due to the geographic location constraints of the case organisation and its parent multinational company. MID-3 stated:

Honda being, a multi-national firm and the parent company has offices at different locations. There is an Australian office with a Japanese manager as the head of the company who works with an Australian Manager. Our company, being automobile supplier, distributor and maintenance spare parts provider, didn't have much cultural issues but the issue was related to the high quality standards expected from the international head office. The standards were enforced by the Japanese manager in Australia. At the end of selection stage, we had to obtain approval from the head office in Japan. Culturally we had to convince Japanese of our reasons for selecting the product (MID-3).

Similarly, when asked about ‘government or regulatory changes’ LE1 acknowledged the relevance of this factor and was able to relate it to their practical experience. Being an educational institution, LE1 explained that they had government or regulatory reporting

requirements. It was added that most of those requirements were captured at the early stages of implementation and recorded in the fit-gap phase. The application was customised to meet the expected outcomes. SME Implementer also recommended government or regulatory factors, stating that they should be requirement drivers:

Government regularity changes such as tax related (changes), yes these are relevant to planning stage but it would be better to call them Government or regularity drivers or requirements (SME implementer)

Similarly, SME provided insight on their practical experience in relation to the significance of meeting regulatory requirements;

In MYOB, there was one automated process to compose BAS reports (a requirement of the Australian Taxation Office [ATO]) for submission. Initially in B1 (ERP application), BAS was an “add on” and unfortunately we found it hard to resolve and couldn’t function it appropriately. Therefore, we had to work with the ATO and manually complete the requirements. We didn’t have any idea about this issue at the start and it just erupted in the implementation or maybe it was a weakness in the product to meet a core legislative requirement. The Implementation partner kept saying that there is nothing wrong with the product and everything would work fine but it didn’t. After implementation, when the application was practically tested, the reports did not match, so we had to fix that issue quickly. Based on our experience, it would be nice to have any such complicated requirements looked into earlier, to avoid inconvenience (SME).

In response to ‘external environmental factors’, LE1 acknowledged experiencing them. LE1, being the technical resource manager for the project, related this factor with internal and external application integration requirements.

Regarding ‘project management’ factors, both LE1 and LE2 endorsed most of the factors apart from the two factors related to communication strategy and techniques for communication. LE1 suggested moving communication factors to the pre-planning stage. Small and midsize business case interviewees also endorsed most of the project management related factors. MID-1 added,

We did all that project management stuff in the Build stage but not in planning. This was one of our mistakes in the JDE Financials implementation but later during CRM

implementation, we managed to correct it and project plan in the planning stage. (MID-1)

In response to the 'detailed project plan & communication strategy' factor, both LE1 and LE2 endorsed its relevance and stated that it was carried out at a higher level. Similarly, all small, midsize and SME implementer participants acknowledged developing a detailed project plan and communication strategy in the planning stage. In response to the 'project leadership (risk & issues)' factor, LE participants considered leadership as a vital factor for the success of an ERP project. Both participants stressed the need to have an early identification of project requirements for an effective leadership and an active management of leadership risks of the project. Likewise, all small midsize and SME implementer acknowledged the significance of having effective project leadership and a mechanism for risks and issues enforced in the planning stage.

In regards to the 'clear & well defined objectives (scope)' factor, both LE participants identified it as important and confirmed that they had experienced it. Similarly all small midsize cases and SME implementer acknowledged experiencing this factor and recommended it to be considered in the planning stage.

When asked about 'organisational change management', the LE participants endorsed its relevance and stressed the need to have organisational change planned. It was stated that the organisational change was not appropriately planned for or managed in their experience; thus their implementation suffered negative consequences. Similarly, all small, midsize and SME implementer acknowledged the significance of organisational change requirements and recommended that the process should start from the planning stage. MID-1 argued that they were unable to perform organisational change management effectively but recommended it should be considered by all small-midsize companies in the earlier parts of planning.

We should have considered organisational change management but didn't, therefore we faced issues. We recommend this must be considered in the planning stage (MID-1)

In response to the 'risk planning & monitoring' factor, both LE participants acknowledged its significance and suggested having a risks and issues management mechanism enforced, starting from the planning stage and continuing throughout the project. Similarly, small-midsize and SME implementer representatives acknowledged experiencing this factor and recommended including it in the planning stage. MID-1 stated that they were unable to perform

risk planning and management effectively and recommended it be managed earlier in the project.

Similarly, all small, large and midsize case participants suggested that the 'effective communication strategy, based on 'who, what, when and how'' and 'effectiveness techniques for communication (survey)' factors were relevant and recommended these to be included in the planning stage. MID-1 further added that in their implementation that effectiveness techniques for communication were not considered (including survey) but recommend the factor to be included in the model.

When case study representatives were asked about the significance of 'limited resources (budget)', all representatives from large, small and midsize cases identified this factor as relevant and critical for implementation. LE1 further added that in their implementation experience, availability of funding was not an issue. Rather, availability of quality resource (staff) was a bigger challenge. As ERP applications are highly sophisticated and have multiple tiers of technical, functional and infrastructure resource requirements, engaging good internal and external resources for the project remained an issue. In contrast, MID-3 suggested moving 'limited resource (budget)' factor to a later stage, as the planning stage should be used to estimate and baseline the activities later in the process, whether resources are less or sufficient can be decided based on baseline information.

In response to executive management commitment, LE2 highlighted a need for a robust communication strategy and discussed the implications of not having executive management commitment for the project. It was argued that their management was highly supportive of the implementation and it would have been really hard to implement without management support. Similarly, all small and midsize case representatives supported the requirement of having executive management support and project reporting to keep them informed. MID-1 and MID-3 were of the view that due to limited size and scale of operations, the management hierarchy is usually flat in midsize businesses.

When asked about factors: 'business impact analysis' and 'definition of individual and collective benefits', both LE participants, MID-1, MID3 and SME participant recommended these factors to be considered in the planning stage. LE representatives stated that that they did not perform any business impact or value add (benefits) analysis but these factors are good practice for managing the change. It was further argued by LE2 that the business impact analysis is a time consuming process and would take time to understand the impact of change on the business due to ERP implementation.

b. Modified factors

No modifications were proposed in the existing factors.

c. Additional factors

There were some factors suggested to be added in the organisational domain of planning stage including, LE2 suggested moving the cross organisational business factor from the pre-planning stage to the planning stage, SME implementer suggested adding the factors plan time and cost of implementation and identify value stream for organisation in the organisational domain of the planning stage. Similarly, according to SME implementer factors such as: change and risk analysis, stakeholder expectation analysis, strategic management issues, external organisational factors and macro environmental were relevant to the organisational domain and should be included in the planning stage. In addition, SME implementer suggested a **new** factor Governing Principles and argued that it would help manage customisations. SME implementer further argued that the guiding principles would enable small or midsize businesses to confirm their charter and restrict them from avoidable customisations:

If there is a Delta Gap [business process gap] between the functionality of the product and the way we run the business, what we need is to adopt a process tool so that we don't need to do development/customisations OR we decide to change the tool (customise) so that it reflects our business processes. Customers do get stuck most of the time with this particularly in Mid-size business, while defining business processes. Let's assume if a customer is going for a Cloud based ERP solution then they will be allowed to have only 2% customisations. This means the business change management will be massive as the business has to change its business process to the tool and NOT the tool to fit the business process. (SME implementer)

Similar to SME implementer, MID-3 also suggested including the factor cost of implementation and argued that there must be clear idea on the total cost of implementation by the end of planning stage. This would assist with an effective tracking of expenditure and to ensure that the project is executed against pre-established baselines.

d. Removed factors

As mentioned early, LE1 (Technical Resource Manager) suggested removing factors 'effective communication strategy based on who, what, when and how', 'effectiveness techniques for

communication survey' and executive management commitment' from the planning stage and adding into the pre-planning stage.

6.4.3.4 Section summary

All pre-identified factors in the organisational domain of planning stage were confirmed. In addition, there are several other factors suggested by participants to relocate into the organisational domain of planning stage. In addition, there are two new factors, one suggested by SME implementer; Governing Principle and the second by MID-3; clear idea on cost of implementation at the end of planning stage as a sub-factor of plan time and cost of implementation. Furthermore, suggestions were made by different participants to relocate other factors to the planning stage: cross organisational business functions, plan time and cost of implementation, identify value stream for organisation (suggested by SME implementer to relocate from technology), change and risk analysis, stakeholder expectation analysis, strategic management issues, external organisational factors and macro environmental factors. Consequently, after analysing the argument and appreciating the experts of case study experts, the researcher has accepted these additions and added new and relocated factors in the organisational domain of the planning stage.

6.4.3.5 People factors

The people factors in the planning stage comprised of the following at the end of the first phase of data collection;

- User support base for application
- Limited resources (people/skill)
- Effective time management
- Change Management;
- Clarity in Communication
- Team Building
- Team Competence
- Training strategies
- Incentives with deliverables

Please, see Appendix 6B (12.2) for a detailed reflection on comments received.

a. Agreed factors

Most of the case study participants acknowledge and endorsed the factors of the people domain in the planning stage.

In response to the factor ‘user support base for application’, LE1 and MID-1 suggested that it be considered whilst deciding on the ERP application while SME, MID-2 and MID-3 stated that this factor should be considered in the planning stage. According to MID-1, the user support base for application is a crucial component to manage knowledge effectively in a scarcely resourced midsize organisation:

We wanted to ensure that the vendor had a local presence so that we could get support as we needed it (MID-1)

When asked about ‘limited resources (people/skill)’, both large size participants (LE1 and LE2) acknowledged experiencing resources/staffing issues at the very beginning of their implementations. Similarly, MID-2 and MID-3 acknowledged experiencing resource challenges in their planning stage, while MID-1 and SME reported that they did not get impacted by staff issues. However, they considered this factor as an important planning stage deliverable.

In response to the ‘effective time management’ factor, LE representatives and SME, MID-2, and MID-3 acknowledged experiencing this factor. MID-1 and LE stressed a need for ‘effective

time management' in the planning stage while MID-3 emphasised a need to complete this factor within comprehensive resource management plan. According to MID-3,

Time Management falls into development of a resource management plan. This plan should be developed in the planning stage and adopted during the entire implementation. It should have a detailed listing of the number of resources required by the project, the duration of their engagement, utilisation during the entire project, the training strategy for staff, ups and down of the team, (team building, competence building and process of team building not aware of... did not go in that detail). (MID-3)

When case study organisations were asked about their 'change management' preparedness in the planning stage, both LE representatives, SME, MID-1 and MID-3 specified that they considered change management to be an important component of ERP implementation. LE representatives indicated that their change management plan commenced development in the planning stage, but the change execution took place later in the process. All participants also acknowledged the significance of 'clarity in communication' and recognised it as an important factor to be considered in the planning stage. SME indicated that they did not experience true requirements for clarity in communication in planning stage but recommended that it should be considered by other small midsize businesses. When case study representatives were asked about their 'team building' efforts in the planning stage, both LE representatives claimed that they planned for it in planning while SME identified it as important, but did not consider it. SME implementer also specified the significance of team building and suggested it to be renamed as 'build team'. Similarly when interviewees were asked about 'team competence', both LE participants stated that they considered the competence of the team whilst hiring staff and tested their performance during staff probation periods. Once again, SME implementer endorsed the significance of this factor but also suggested renaming it as 'develop competency matrix'.

When asked about developing the 'training strategies' factor, LE1, MID-1 and MID-3 acknowledged it as important and claimed that they considered it while developing a high level training strategy. SME implementer specified this factor as being important and suggested to rename it as develop training strategies. According to SME, the end user training started too late and was not appropriately delivered. The training was not sufficient to satisfy end user expectations, hence change resistance was a major challenge and staff remained upset due to poor implementation experiences.

In response to the incentives with deliverables factor, LE1 acknowledged its significance but said that they did not consider it. Likewise, SME implementer recognised the importance of this factor for staff motivation and recommended it to be considered in the planning stage. MID-3 stated that:

No incentive based strategy was adopted or used (MID-3).

b. Modified factors

There were some modifications in the people domain factors. For instance, LE1 suggested expanding on factor user support base for applications by adding 'analysis' at the front, proposing that it be renamed as analysis of user support base for application. Similarly SME implementer suggested modifications: renaming team building to build team, team competency to develop competency matrix, and training strategies to develop training strategies. SME implementer recommended these modifications for better understanding of the meaning behind each factor and also their presentation. These modifications are accepted and the proposed changes are reflected in the revised model.

c. Additional factors

There were factors suggested to be relocated into the people domain of the planning stage. In addition there were some **new** factors suggested by some experts. For instance, LE2 suggested moving the conflict resolution procedure factor from the pre-planning stage to the planning stage to consider it whilst planning for the human resources of the project.

I think conflict resolution procedures should be done at very early stages of the planning stage. (LE1)

Similarly, LE1 also suggested adding a **new** factor called team management and control structure in the people domain. Additionally, LE1 suggested relocating some existing factors under this new factor: team building (such as forming, norming, storming, performing) but indicated that it should happen towards the end of the planning stage, team competence (such as analysis and external available competence comparison) and training strategies (such as for Functional and Technical staff). According to LE1,

(The) Planning stage is where it should happen (performing: out of forming norming storming and performing) but I think our teams were developed in a little bit of isolation. The team didn't form solidly until the construction stage (team bonding) but I think it

should have happened in the planning stage. I think our team was built physically but I don't think it did that storming thing early. Maybe some team building upfront activities would have helped. (LE1)

Similarly LE2 suggested having a training strategy established in the planning stage but executed in the build stage. Therefore, the factor should be moved to build stage. Furthermore, LE2 suggested considering **new** factors 'plan for testing and identify staffing requirements' and 'develop testing strategy, test plan, test scenarios and test cases recorded in testing management tool (such as Quality Centre)'.

MID-3 also suggested adding a **new** factor for recording 'resource utilisation details' appropriately in the planning stage. Similarly, SME implementer suggested moving 'develop communication strategies' and 'develop conflict resolution procedures' from the pre-planning stage to the planning stage and add **new** factor 'develop knowledge management strategy' in the planning stage.

SME-implementer suggested adding **new** factors in the people domain of the planning stage including, 'allocation of staff on project for knowledge transfer', 'internal and external team engagement planning', 'develop testing strategy', 'identify key business users as testing resources' for user acceptance testing (UAT) and 'define Post Go Live support structure' on a higher level. According to SME implementer, all these factors are critical for the success of ERP implementations and (understandably) in-depth information cannot be available on each of the above in the planning stage. It was argued that to maintain focus, it would be important to start planning for these factors in the planning stage and later explore further details as available.

MID-3 also suggested adding **new** factors 'commitment from department resources' for end user testing (UAT), technical and functional 'resources engagement' and 'package selection design and contract signing'. These suggestion were made based on MID-3's practical implementation experience and argued that the resource engagement is a critical component, as business staff are expected to be overloaded with their day to day operations. Due to the small size operations of midsize businesses, it would be difficult to allocate business staff or subject matter experts to the project easily. MID-3 also argued to establish stage gates at the start and end of baseline activities to see what was practically achieved as an outcome. This recommendation was based on PRINCE2 (Projects in Controlled Environment) methodology for project management.

d. Removed factors

There were some factors suggested by some experts to be removed from the people domain of planning stage. For instance, LE2 (Testing manager) suggested moving the factor user support base for application from planning stage to later stages before the construction stage. According to LE2,

User support base for application was not considered earlier in our experience. I think it was considered in the construction stage but could be considered in build stage (LE2).

In contrast, LE1 (Technical Resource Manager) acknowledging the benefits of a user support base factor; arguing that it should be considered in the planning stage.

Analysis of User support base of application – I am not sure whether it was considered during the selection process or available at the time but I consider it important and (it) must be considered in the planning stage of implementation

Based on above argument and counter argument, the factor 'user support base for application' is not removed from the planning stage. Similarly, MID-3 suggested moving 'team building' and 'team competence' later to the Build stage and 'incentive with deliverables' factor was not experienced by MID-3. Furthermore, SME-implementer initially suggested moving 'realistic end user expectation analysis' factor from the organisation domain to the people domain of the planning stage and then argued to move it later (with minimal or no customisations) to the end of the Fit-Gap stage or the Design stage. This is to ensure that end user expectations are correctly understood and recorded realistically.

6.4.3.6 Section summary

With some changes/amendments in the existing factors, most of the pre-identified factors were endorsed by case study participants. The changes to existing factors include, 'analysis of user support base for application', adding a new factor '*Team management and control*' and repositioning some existing factors under this such as, 'outline team competence matrix', 'develop training strategies' and so forth. In addition, there were factors suggested to be relocated from other stages to the People domain and some new factors proposed by different participants. Factors recommended to be relocated elsewhere within the model were: 'conflict resolution procedures', 'realistic 'end user' expectation analysis (minimal or no customisations)', 'limited resources (skills)', 'develop communication strategies', 'develop

conflict resolution procedures' and 'develop knowledge management strategy'. Similarly new factors proposed by participants were: '*plan for testing and identify staffing requirement*', '*develop testing strategy*', '*test plan*', '*test scenarios*' and '*test cases record in QC*', '*resource utilisation details*', '*allocation of staff on project for knowledge transfer*', '*internal and external team engagement planning*', '*develop testing strategy*', '*identify key business user - testing resources*', '*identify key business staff for UAT*', '*define post go live support structure (high level strategy)*', '*commitment from department resources (business)*', '*resources engagement (technical, functional)*', '*package selection design and contract signing*' and finally '*establish stage gates – baseline and deliverables*'.

6.4.4 Summary of Planning discussion

Table 6.5 shows the revised Planning stage after the analysis of case study interviews. Altered factors are represented in the middle column as follows:

- ~~Text removed~~
- Text added.

The final column shows the amended stage after the case study analysis.

Table 6.5: Planning stage amended after case study analysis

Domains	Planning stage (Before Case study)	(New factors or changes as recommended)	Planning stage (After Case study)
Technology factors	<ul style="list-style-type: none"> • Selection criteria with relevant parameters • Accurate information on ERP applications • Less reliance on sales advice • Time & Cost of implementation • New technology adoption issues • Industry standards • Proposed application System architecture analysis • Technical staff/consultant expertise • Realistic “end user” expectation analysis (<i>Minimal or no customisations</i>) • Identify value stream for organisation 	<ul style="list-style-type: none"> • Technical requirements identification • Technical requirements analysis • <i>Decision on Testing Tools – QC (QA, QM protocols set)</i> • Data Migration Strategy development • Data migration strategy communication & feedback • <i>Plan for testing and identify Tools required for Testing QC</i> • <i>Planning Decisions should be Made</i> • Engage with partners • Define compatibility issues with other applications • Identify Applications for Integration • ERP complexity <i>management planning</i> <p style="text-align: center;"><u>END of Planning and before next stage</u></p> <ul style="list-style-type: none"> • <i>Establish infrastructure strategy – Technology requirements</i> • <i>Establish Application Integration strategy</i> • Establish Data migration Strategy • Data validation, verification and cleansing • Time & Cost of implementation (software cost) <i>end of this stage these were known</i> • <u>Data migration</u> <ul style="list-style-type: none"> ❖ <i>Early development of strategy</i> ❖ <i>Strategy Communication</i> • <u>Application integration</u> • <i>Identify systems for integration</i> 	<ul style="list-style-type: none"> • Selection criteria with relevant parameters • Accurate information on ERP applications • Less reliance on sales advice • New technology adoption issues <i>Mobility, HA, Complexity, network</i> • Industry standards • Proposed application System architecture analysis • Technical staff/consultant expertise • Realistic “end user” expectation analysis (<i>Minimal or no customisations</i>)-<i>Fit gap</i> • Identify value stream for organisation • Technical requirements identification and analysis • <u>Plan for Testing</u> <ul style="list-style-type: none"> ◦ <i>Decide on Testing Tools– QC (QA, QM protocols set)</i> • Engage with technical stakeholders • Identify Applications for Integration • Compatibility issues with other applications • <i>Establish infrastructure strategy – Technology requirements</i> • <u>Establish Application Integration strategy</u> <ul style="list-style-type: none"> • Identify systems for integration • <u>Establish Data Migration strategy</u> <ul style="list-style-type: none"> • Strategy communication • Data validation, verification and cleansing • Time & Cost of implementation (<i>software cost - end of this stage these were known</i>)

Domains	Planning stage (Before Case study)	(New factors or changes as recommended)	Planning stage (After Case study)
Organisational factors	<ul style="list-style-type: none"> • Cultural factors (local, national) • Government or regularity change • External environmental factors • Project Management: <ul style="list-style-type: none"> ❖ Detailed project plan & communication strategy ❖ Project Leadership (risk & issues) ❖ Clear & well defined objectives (Scope) ❖ Organisational change management ❖ Risk Planning & Monitoring; ❖ Effective Communication strategy, based on “who, what, when and how” ❖ Effectiveness techniques for communication (survey) ❖ Limited Resources (Budget) • Executive Management Commitment • Business impact analysis, • Definition of individual and collective benefits 	<ul style="list-style-type: none"> • Cross organisational business functions • Plan Time & Cost of implementation • Identify value stream for organisation • Change and Risk Analysis • Stakeholder expectation Analysis • Strategic Management Issues • External Organisational factors • Macro environmental factors • Establish project Guiding Principles as part of Charter (no customize) • Clear idea of Cost of implementation at end of this Stage 	<ul style="list-style-type: none"> • Cultural factors (local, national) • Government or regularity change • External environmental factors • Project Management: <ul style="list-style-type: none"> • Detailed project plan & communication strategy • Project Leadership (risk & issues) • Clear & well defined objectives (Scope) • Organisational change management • Risk Planning & Monitoring; • Effective Communication strategy, based on “who, what, when and how” • Effectiveness techniques for communication (survey) • Limited Resources (Budget) • Executive Management Commitment • Business impact analysis, • Definition of individual and collective benefits • Cross organisational business functions • Plan Time & Cost of implementation <ul style="list-style-type: none"> • Clear idea on Cost of implementation at end of planning Stage • Identify value stream for organisation • Change and Risk Analysis • Stakeholder expectation Analysis • Strategic Management Issues • External Organisational factors • Macro environmental factors • Establish project Governing Principles as part of Charter (no/less customizations)
People factors	<ul style="list-style-type: none"> • User support base for application • Limited resources (people/skill) • Effective time management • Change Management; • Clarity in Communication • Team Building • Team Competence • Training strategies • Incentives with deliverables. 	<ul style="list-style-type: none"> • Conflict resolution procedures • Plan for testing and identify staffing req. • Develop Testing Strategy, Test plan, test scenarios and test cases record in QC • Realistic ‘end user’ expectation analysis (Minimal or no customisations) • Limited resources (Skills) • Develop Communication Strategies • Develop conflict resolution procedures • Develop Knowledge management strategy • Allocation of staff on project for Knowledge Transfer • Internal and external team engagement planning • Develop Testing Strategy • Identify key business user - testing resources • Identify key business staff for UAT • Define Post Go Live support structure (high level strategy) • Commitment from department resources (business) • Resources engagement (technical, functional) • Package Selection design and Contract signing • STAGE GATES – BASELINE and ACHIEVE 	<ul style="list-style-type: none"> • Analysis of User support base for application • Limited resources (people/skill) • Effective time management • Change Management <i>planning</i> • Clarity in Communication • Team management & control <ul style="list-style-type: none"> • Team Building • Outline Team Competence <i>matrix</i> • Develop Training strategies • Incentives with deliverables. • Conflict resolution procedures • Plan for testing and identify staffing requirement • Develop Testing Strategy, Test plan, test scenarios and test cases record in QC • Realistic ‘end user’ expectation analysis (Minimal or no customisations) • Limited resources (Skills) • Resource utilisation details • Develop Communication Strategies • Develop conflict resolution procedures • Develop Knowledge management strategy • Allocation of staff on project for Knowledge Transfer • Internal and external team engagement planning • Develop Testing Strategy • Identify key business user - testing resources • Identify key business staff for UAT • Define Post Go Live support structure (high level strategy) • Commitment from department resources (business) • Resources engagement (technical, functional) • Package Selection design and Contract signing • Establish Stage Gates – Baseline and deliverables

Chapter Seven

Phase two: Case study results and discussion (part two)

7.1 Case study results (part two)

This chapter is a continuation of Chapter 6. In this chapter, the researcher will continue to report on the investigation conducted in the remainder of six cases involving a large business, a small business, midsize businesses and an ERP provider.

The interviews for the case study were conducted as part of the second data collection stage. This chapter will continue reporting on the case study organisation's feedback on the proposed ERP model content based on their practical experiences. The chapter will be followed by the Conclusion chapter. The chapter is organised as follows:

- Discussion on Build Stage
- Discussion on Construction Stage
- Discussion on Go Live stage
- Presentation of final model

7.2 Case study - results, analysis and modification

As a reminder, ERP implementation is divided into following five stages:

- **Pre-Planning stage:** to start the implementation requirements,
- **Planning stage:** Plan for implementation – (*planning remains an ongoing process*)
- **Build stage:** A combination of Set-up, Re-engineer, System design (functional and technical)
- **Construction stage:** A combination of configuration, development (if customised) and testing
- **Go Live stage:** Events immediately before (sign off) and during Go Live activities.

Figure 7.1 once again provides details of the six cases interviewed with their relevant classifications. The discussion in this chapter commences from the Build stage

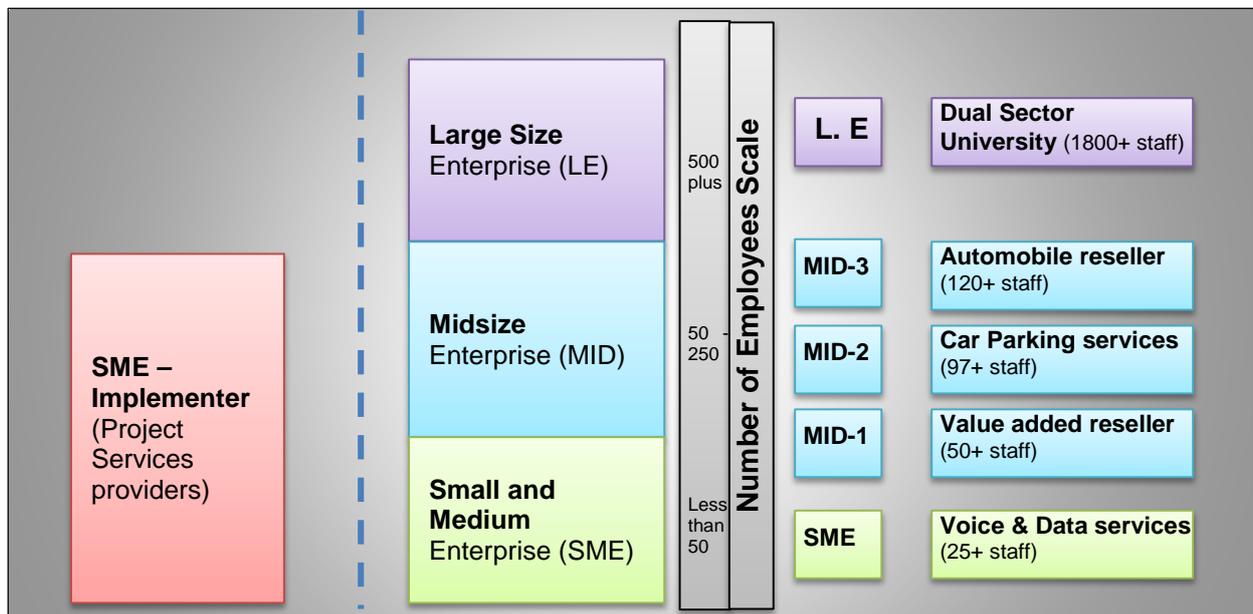


Figure 7.1: Scale of case businesses

7.2.1 Build stage

(Set-up, Re-engineer/Fit-gap, System design)

The Build stage of ERP implementation comprises of three sub-stages;

- **Set-up:** includes setting up technology and business requirements gathering
- **Re-engineer:** includes requirements validation, business process mapping and re-engineering, identification of gaps within the business processes and application.
- **System design:** The design stage comprises of both Business/Functional design and Technical design of the application.

Table 7.1 shows the “Design stages” factors at the end of the phase one of the data collection. In the end of this section, a revised design stage factors will be presented; based on case study feedback. The data obtained from the case study analysis is presented in four categories;

- **Agreed** factors (factors agreed/experienced to remain unchanged and by whom)
- **Modified** factors (changes in the factors made but not placement)
- **Additional** factors (new added factors and/or factors moved from other stages)
- **Removed** factors (factors removed completely or moved to other stages).

Table 7.1: Build stage factors before case study analysis

Factors for ERP adoption	Build stage(Set-up, Re-engineer, System design)
Technology factors	<ul style="list-style-type: none"> • ERP complexity; • In house expertise; • Cost of implementation • ERP compatibility issues with other applications • Development of a system design strategy • Business & Technology Issues
Organisational factors	<ul style="list-style-type: none"> • Cost of implementation <ul style="list-style-type: none"> ○ Limited Resources (Budget) • Situational Leadership issues • Issues due to Mergers/ Acquisitions • Cross dimensional factor impact • <u>Project Management:</u> <ul style="list-style-type: none"> ❖ Project monitoring & control ❖ Risk Monitoring; ❖ Stakeholder expectation management ❖ Effective Communication & Coordination; ❖ Organisational change management ❖ Organizational resources management • Organisational structure definition • Organisational Ideology; • Effects of managerial style
People factors	<ul style="list-style-type: none"> • <u>Limited Resources (People/Skill)</u> <ul style="list-style-type: none"> ○ Trained business staff ○ Professional external consultants ○ Temporary staff to backfill existing business staff • In-house expertise • Team management & control • <u>Change Management</u> <ul style="list-style-type: none"> ❖ Business support for UAT team ❖ Staff attitude to change ❖ Management attitude ❖ Organisational Staff engagement • Clarity in communication • Communication transparency • Internal & external team engagement

Suggestions to change the stage name

Whilst discussing “Build stage” factors, MID-3 suggested renaming the Build stage to Functional Solution Design stage. It was argued that as sub-stages listed in the Design stage include; Set-up, Re-engineer, System design and Blue print/Fit-Gap; the purpose of the stage would be to gather requirements, complete functional design and identify gaps in the solution for potential customisations. Therefore, it was suggested to rename this stage as Functional Solution Design stage. It was further added that the recommended change was to assist

midsize business leaders, who would likely not have advanced understanding on ERP implementation details and this new name would help them understand activities in this stage.

Similarly, SME implementer also suggested renaming Build stage to Detail Design or Blue print stage. SME implementer suggested adding Functional Design as new sub-stage in addition to other pre-identified sub-stages.

I think “Build” as a stage name is very misleading. I think rather (than) having “Build” as the name of this stage, it would prefer it to be renamed as Blue Print Stage. If you want to avoid giving your model SAP stage terminology then rename it as Detail Design Stage (SME Implementer).

As per our experience with small and midsize businesses, when we get engaged, we start in the design stage as a first step. We generally have most of the information sorted by then and we build, install on their system and then we show them the product part of design delivery. We demonstrate them the process as how SAP does it and ask them how would your process best fit. We expect them to make decisions whether to change their processes or change the tool? Based on this Box Drop presentation we assess the processes they decide to adopt and maintain 25% of variation or change on the core scope. Now if we get into next stage and they want to make further changes let’s say up-to 50%, then we revisit the entire previous (design) stage again (SME implementer).

The argument was accepted and the stage named was changed to “**Detail Design Stage**” and reflected in the revised model.

7.2.1.1 Technology factors

Based on the literature review and first data collection stage (expert panel) findings, Technology factors in the 'Build stage' comprise:

- ERP complexity;
- In house expertise;
- Cost of implementation
- ERP compatibility issues with other applications
- Development of a system design strategy
- Business & Technology Issues

While discussing factors in Technology domain of "Build stage", both large size business interviewees agreed with the content presented and acknowledged that most of these factors are aligned with their practical experiences. Similarly, small and midsize interviewees and the SME implementer gave feedback based on their practical experiences and knowledge of their implementation. The feedback obtained from the interviews is recorded below in four categories including, "Agreed", "Modified", "Additional" and "Removed" factors. Please refer Appendix 7A (12.3) for a detailed reflection on comments received.

a. Agreed factors

Apart from some instances, most of the case study participants agreed with the factors identified in the Technology domain of the Build stage. When participants were asked about 'ERP complexity', the SME, large size and midsize business representatives agreed that they had experienced this factor in their implementation. LE1 shared his perspective by stating that the complexity of ERP implementation becomes clearer after fit-gap analysis is completed toward the end of design stage. The team would then be able to see ERP complexities clearly. LE1 further added that once requirements gathering and fit-gap analysis phases are complete, it leads to other Build stage activities. In this stage, the organisation and vendor should clearly be able to scope the activities and set the direction for the implementation. SME and MID-1, MID-2 acknowledged that the 'ERP complexity' was clearer in this context and by adding more change in the application would increase the cost, and hence manipulate the dollar value with the benefits received. Similarly MID-3 also accepted the argument based on the fact that in the build stage the business expected a 'technical lock down' of scope and the vendor selected, technical details finalised, size of implementation clearly defined and required technology instruments procured (such as servers, hardware and other technology material). In contrast, LE2 and SME implementer argued that it would be difficult to envisage details of

the complexities in the Build stage. The Build stage will would enable to outline requirements and compose design details but the insight on complexity would remain to be at a higher level.

In response to the 'in house expertise' factor, large size participants (LE1 and LE2), small midsize business participants (MID-1, MID-2, SME) and the SME implementer acknowledged its significance and confirmed experiencing this factor in their implementations. It was added that having in-house expertise is critical for the project and also for post implementation support services. SME implementer was of the view that the training needs for staff should be identified and training should be provided accordingly. In contrast, MID-3 suggested that in-house expertise related issues should be resolved by this time with internal appointments and external contractor staff; hence this factor should be moved to earlier stages of the model.

When case study organisations were asked about the 'cost of implementation' factor, all participants from small, midsize and large size case study organisations acknowledged experiencing it in their implementations. It was added that the 'cost of implementation' revision is an ongoing process and should continue throughout the implementation starting from the Planning stage (MID-3 and SME implementer).

In response to the factor 'ERP compatibility issues with other applications', LE1, SME, MID-2 and MID-3 acknowledged the significance of application compatibility issues and confirmed experiencing such issues in their implementations. MID-3 added that ERP capability issues actually relate to the application integration with internal and external applications. Aspects relating to integrations should be clearly documented and technical designs developed in the design stage for later 'practical' delivery.

When asked about the factor 'development of a system design strategy', the large size participants endorsed its relevance and all small midsize business cases representatives and the SME implementer acknowledged its relevance and recommended it to be included in the Technology domain of Build stage.

Regarding Development of system design strategy, it was developed as an output of the Fit Gap analysis in the design stage. (LE1)

While discussing 'business & technology issues', LE1 and small midsize business representatives acknowledged its relevance and recommend it to be considered in the build/design stage because of this relevance. According to LE1, 'business and technology issues' start to appear in the Build stage but their full impact is realised in the Construction

stage. In contrast, LE2 stated that these factors were not considered until the Construction stage or even later, closer to the Go Live stage. LE2 did acknowledge these factors as important and considered them from the Planning stage through to the Build and Construction stages.

Regarding Business technology issues, any other related issues to technology adoption; I am unsure whether we considered them in Build or Construct stage. They started to unfold during Build phase though, but in construct phase they were clearly understood. (LE-1)

About business and technology factors review, I don't believe they were even thought of until we were in the Construct stage or even after the implementation, until Go Live. But for ERP implementation, they should be considered in Build/Design stage. They should start to be considered from (the) Planning stage and revised with the project stages of implementation. Finding out once you design, gradually reviewing/revising them as you go. (LE2)

b. Modified factors

SME-implementer and MID-3 suggested changing the factor 'ERP compatibility issues with other application' to 'ERP integration aspect'.

c. Additional factors

Both large size participants, SME and SME implementer suggested relocating data migration and relevant activities from the Construct stage to the Build stage including its sub-stages: 'early development data migration strategy (revision and update)', 'strategy communication', 'data quality analysis and data cleansing'. MID-3 argued that a data migration strategy should be developed earlier and feedback obtained from relevant stakeholders. The data conversion (DC) processes should be streamlined and the data cleansing effort should start early. Furthermore, the data sampling should be completed early and then carried on with the data cleansing exercise until the Go live stage.

I think data migration should probably start in the Build stage because we were continuously taking the data from the legacy system and doing a full review of the data and mapping it across into Campus Solutions co-related fields. Based on experience, I think activities such as early strategy development, the communication for data migration and even data quality analysis should all be in the Build stage. Similarly, the

data cleansing process should be in the Build stage that carries across into Construction. Precisely the process of cleansing and migration should continue in the Construction phase and the rest all should be completed in Build. Remember, we had to go through a number Data Conversion iterations before go live migration (LE1).

Data Migration should start earlier and its requirements should be done way earlier and practically completed in this (Build) stage. You don't want to get to Construction stage and realise that you have all these data issues to deal with putting negative impact on the project and locking up all system requirements (MID-3).

You need to define your Data Migration Strategy here (Build stage) as part of Technology. It should be completed in the Design phase. You would definitely want to know what and how Legacy data looks like, and what to do with it. In Construction phase you will perform Data conversion activities – ongoing, several iterations. (SME implementer)

MID-3 suggested a **new** factor, establish requirements and sampling and SME implementer suggested data structure establishment for migration as a **new** factor.

Similarly, the large size case participants, SME implementer and MID-3 suggested relocating application integration factors from the Construct stage to the Build stage as well. It was stated that similar to recommending an early start for data migration planning, the application integration requirements should be identified, including identification of systems for integration.

Based on our experience, application integration definitely happened in Construction but the identified and planning processes for integration started in the Build phase. All systems were identified before the construction started. In the Construction phase we streamline only those systems that were required to be integrated with Campus solution (LE1).

I believe compatibility issues with other applications related with application integration. Remember, Integration is another important piece of work so it is better to plan early, lock out the integration and get it settled in the design phase. You should know early what interfaces are required to be built and what applications should be integrated. In the Design stage, identification is important but later it can be changed. The practical integration is achieved in the Construction stage (MID-3).

Other small midsize business participants (MID-1, MID-2 and SME) maintained the same argument of having an early start to plan for application integration. Some representatives even gave practical examples. For instance, MID-2 experienced an issue with their OLAP reporting;

OLAP was a reporting tool that needed integration with SAP B1 [ERP application]. We decided to use OLAP rather than SAP build-in Crystal reports and faced serious integration issues at 'Go live'. This caused panic but we were able to have a quick resolution. My recommendation is, always plan ahead for application integrations. (MID-2)

LE2, MID-1 and SME implementer suggested moving factor 'ERP installation aspects' from the Construction stage to the Build stage. It was stated that

ERP installation aspects: We would have done that in the Build stage not here in Construction and we recommend this to be considered in the Build stage. (MID-1)

MID-1 stated that they learnt from mistakes and rectified them, resulting in a second ERP implementation executed in a controlled manner.

There were **new** factors suggested by some participants. For instance, LE2 suggested adding 'Establishment of testing strategy, testing processes, script creation and recording' in the Build stage.

Planning for testing, test scripts and test cases, understanding the design documents and translating them into test scripts should be completed in the Design stage. The test strategy documents should expand into system testing and later user acceptance testing (UAT) documents completion. We completed all these documents in our experience and handed over relevant documents to the operational team after Go live (LE2).

SME implementer suggested **new** factors for the Build stage: 'Build use case maps', 'Show product in design' and 'Customisation and development required'.

In the Build stage; building meaning that you are picking your delta [vanilla instance of the application], acknowledging sign off has already been obtained and you completed use case map, customisations identified and finally you just start building. All these factors should be considered as well (SME Implementer)

In addition, SME implementer suggested adding a **new** factor 'Technical and infrastructure strategy definition' in the technology domain.

In (the) Build Stage, you also need to include your infrastructure strategy. This should contain information on what boxes you need, what network connections, some decision points on do you want to go on mobility, are you going enterprise portal - internal or external, technology design factors into the deployment plan and so forth. (SME implementer)

d. Removed factors

According to SME implementer, there is less probability to have accurate information on ERP complexities in the Build stage; hence this factor should be moved to the later stage.

There was a general consensus of having experienced 'cost of implementation' revision (fine tuning), based on potential customisation or development, estimated within the Build stage. It was suggested by the SME implementer that this factor is not relevant to Technology, hence should be moved to other domains within the Build stage.

7.2.1.2 Section summary

Apart from some modifications suggested by interviewee participants, most of the technology factors in the Build stage were endorsed. The suggested changes included; adding a new sub-factor within in-house expertise called 'identify training requirements' and replacing ERP compatibility with ERP integration issues with other applications. An interviewee suggested relocating 'cost of implementation' from technology to organisational domain but the researcher did not make this change as the costs indicated may be associated with technology for hardware, software or any other technical equipment purchase for the project. It was appreciated from the comments that a need to have stage-wise implementation cost revision would be beneficial.

In addition to the modifications suggested, the participants suggested removing and relocating data migration planning factors to an earlier stage of the model: 'early development of strategy' and 'strategy communication'. Furthermore, it was recommended to add factors from other stages including: 'Data migration' and associated sub-factors: 'data quality analysis' and 'data cleansing'. Additionally, it was argued adding **new** data migration sub-factors: 'data migration (revision/update)', 'data structure establishment for migrations' and 'establish requirements and sampling'.

Furthermore, the participants suggested adding another **new** factor, 'technical and infrastructure strategy' and its sub-factors 'technical lock down', finalise 'vendor selection' and 'procurements of hardware and software' for the implementation. In addition, factors related to 'application integration' planning were suggested to move to an earlier stage of the model including: 'identify systems for integration'. However, the practical delivery of application integration was still expected to take place in the Build stage, therefore, application integration sub-factor 'integration points, systems for integration' was left in the Build stage.

It was also suggested by interviewees to add **new** factors: 'establish testing strategy' and associated sub-factor 'setup test processes, script creation and recording'. Similarly a new factor for cost of implementation was stated to be 'Cost of technology' and other new factors: 'Build use case maps for design', 'show product in design' and 'customisation and development required' were suggested.

Considering the relevance of all these suggested changes, these are reflected in the revised model accordingly.

7.2.1.3 Organisational factors

Based on the literature analysis and the first data collection results, the organisational factors in the 'Build stage' comprise:

- Cost of implementation
- Limited Resources (Budget)
- Situational Leadership issues
- Issues due to Mergers/ Acquisitions
- Cross dimensional factor impact
- Project Management:
 - *Project monitoring & control*
 - *Risk Monitoring;*
 - *Stakeholder expectation management*
 - *Effective Communication & Coordination;*
 - *Organisational change management*
 - *Organizational resources management*
- Organisational structure definition
- Organisational Ideology;
- Effects of managerial style

When Organisational factors in the “Build stage” were discussed with the case study organisations, the large size participants accepted factor’s relevance and endorsed them in principle. Similarly, small and midsize case interviewees provided similar insights. Please, see Appendix 7A (12.3) for a detailed reflection on comments received.

a. Agreed factors

Most of the factors listed in the organisational domain of the Build stage were endorsed by case study participants. While discussing ‘cost of implementation’ and ‘limited resources (budget)’, LE1 and small midsize business case interviewees acknowledged the factors’ relevance and confirmed that cost revision in the design stage is important. SME implementer suggested a stage-wise cost review and refinement to control expenditure. In contrast, LE2 claimed that this factor was not relevant to their implementation as they had pre-allocated funds and those were sufficient to complete the project. The researcher questioned whether the cost estimates were revised at all: LE2 responded in the affirmative.

Similarly, in response to ‘situational leadership issues’; all case study participants endorsed the significance of this factor and acknowledged experiencing it. Furthermore, large size participants suggested moving this factor to an earlier stage of implementation, as leadership issues should be resolved well before the Build stage.

In response to ‘issues due to mergers/acquisitions’, none of the participants were able to relate this factor with their implementation experience. In contrast, SME implementer and MID-3 acknowledged the relevance of this factor based on changes in circumstances. MID-3 stated that the project scope would need to be revised with new expectations due to mergers and/or acquisitions. SME implementer was of the view that small and midsize companies should consider these issues, with potential significant implications on their ERP implementation. Hence, it should remain included in the Build stage.

Similar to the previous factor feedback, when asked about ‘cross dimensional factor impact’, none of the participants were able to relate this factor to their practical experience. However, SME implementer did consider this factor to be important and stressed the need to have it considered in the Design phase.

Collectively, the large, small and midsize business representatives acknowledged most of the factors listed under ‘project management’. The large business interviewees acknowledged experiencing these factors either in the Build stage or later in the Construct stage. The LE

interviewees recommended that project management factors should be included in the Build stage for effective upfront planning and management. All participants from large and small midsize business cases collectively endorsed the sub-factors of project management: 'project monitoring and control', 'risk monitoring', 'stakeholders expectation management', 'effective communication and coordination', 'organisational change management' and 'organisational resource management' and recommended them to be included in the Build stage of the model. MID-1 provided some insight on their 'project management' experiences, indicating that they had two implementations; the first was JD Edwards-Financial and the second was MS Dynamic CRM. In the first implementation, the project was outsourced to an implementation partner; hence there was no control on project delivery. In the second instance, they decided to appoint an internal project manager as the project custodian, resulted in vigilant monitoring and management of the project.

In response to 'organisational structure definition', both large size representatives and most of the small midsize participants acknowledged its relevance and recommended that it be considered in the Build stage. Both large-size participants urged a need for an appropriate handling of organisational structure matters to deal with the post implementation support matters and for management of knowledge transfer. SME implementer stated that the organisational structure definition could only be considered if required and recommended it be included in the model.

While discussing 'organisational Ideology', both large size participants acknowledged the significance of this factor on potential change related issues. They were able to relate this factor to their practical experiences and stated that they faced significant change adoption issues due staff resisting the change. The staff maintained their 'status quo' and continued their way of business practice that was related to the thought process and ideology of the organisation. It was recommended to have this important factor included in the model for effective management of issues that could potentially result in post implementation failures. None of the small and midsize participants were able to relate this factor with their implementation experience or considered it important.

In response to 'effects of managerial style', LE1 identified this factor related to the people domain and recommend it to be relocated. Other participants, including LE2, MID-2 and SME, acknowledged the relevance of this factor and recommended it to be included in the Build stage. It was further added that the managerial style directly relates to the success of a project, hence an effective line management involvement and leadership ability of the project manager

is critical. Clear definition of roles and responsibilities would have a positive impact on implementation and an inability to handle these issues could have significant negative impact on project performance and delivery.

b. Modified factors

No modifications were proposed in the existing factors.

c. Additional factors

LE2 recommended adding 'stakeholder expectation analyses' in the Build stage and stated that this should be an ongoing process from this stage's fit-gap process through to the Construction stage:

Based on our experience, Stakeholder Expectation analysis and mapping what something missing until Construction and we recommend it to start in the Build stage (LE-2).

Similarly, LE2 suggested moving factors from other stages to the Build stage. It was argued that 'information system function', 'Effective organisational level communication and coordination' and organisational change management are relevant to the stage and should be added there.

I believe Information system function should be in the Build stage. This relates to how the system will act and should be considered in the Build. Similarly, Communication and Coordination (should) be relocated to the Build stage along with Organisational Change management. In our experience, Communication and coordination didn't happen; trainers were not on-board early and could not engage well. (LE2)

Consistent with the previous experience, SME-implementer suggested **new** factors for the organisational domain of the Build stage. These factors were: 'Scope Management, Detail design; functional details, processes, fit-gap and business process functionality, Expand on strategy for Governing Principles and also Business process change or customisations.

For scope management; SME implementer was of the view that effective *scope management* would be critical for ERP implementation and should be handled within project management. For effective scope management, SME implementer suggested expanding on strategy for *governing principles* and having principles drafted early for effective customisation control and scope management.

Somewhere you will need to think and develop governing principles for the project. I think it should be an organisational factor in the Planning stage. First establish and then we need to work our way through to expand the strategy in later implementation stages. Somewhere in the Build stage you do need to expand on these governing principles as part of your project charter or something that should say adopt change [customisations] in the application. (SME implementer)

As SME implementer recommended to change the name of this stage, it was further added that in this stage, a detailed functional design, process maps, fit-gap and business processes should be completed. All of these key deliverables are important for the success of a project based on business/customer expectations. Similarly, MID-3 suggested adding a **new** factor 'detail design development' containing functional design details, process maps, fit-gap information and business process functionality for the implementation. This factor is similar to SME implementer factor recommended earlier:

Based on experience, people normally do not talk much about BUILD for a stage. They tend to go from Planning and then Blue Print Stage (defining what is going to happen functionally. You can call it Fit gap Analysis stage). As an architect's point of view, there are a lot of technical aspects but from a business point of view, they don't really care about technology but for the functional details. A detailed design should be completed containing functional and technology details before construction stage (MID-3).

d. Removed factors

Both large size participants (LE1 and LE2) recommended having 'situational leadership issues' moved to an earlier stage and acknowledged experiencing situational leadership, especially while managing an external influence on the project.

7.2.1.4 Section summary

In relation to the organisational factors associated to the Build stage, most of listed factors were endorsed by case study participants. The only change was argued by large size interviewees to relocate the 'situational leadership issues' factor to an earlier stage of the model. The researcher decided not to reflect this change, as none of the other participants suggested the same and also situational leadership is more critical while performing the work in the Design and Construction stages rather in the Planning stage.

The case study participants suggested relocating some factors from other stages: 'stakeholder expectation analysis', 'effective communication and coordination' and 'organisational change management'. Similarly there were some recommendations made to add **new** factors in the organisational domain of the Build stage including: 'Scope management', 'Detail Design (containing functional details, processes, fit gap – business process functionality)', 'expand on strategy for Governing Principles', and 'business process change or customisations'.

Considering the relevance of all these suggested changes, these are reflected in the revised model accordingly. In terms of the suggestion of removing the situation leadership factor from this stage and relocate it to an earlier stage, it is important to note that situational leadership is an ongoing iterative process that starts from planning and continues through the project. No other midsize business representative supported this argument. Therefore, the factor has not been removed.

7.2.1.5 People factors

Based on the literature analysis and the first data collection stage findings, the People factors in the 'Build stage' are comprised of;

- Limited Resources (People/Skill)
 - Trained business staff
 - Professional external consultants
 - Temporary staff to backfill existing business staff
- In-house expertise
- Team management & control
- Change Management
 - Business support for UAT team
 - Staff attitude to change
 - Management attitude
 - Organisational Staff engagement
- Clarity in communication
- Communication transparency
- Internal & external team engagement

While discussing people factors in the "Build stage", case study participants from large size, small midsize businesses and SME implementer provided insights based on their practical experiences. Please, see Appendix 7A (12.3) for a detailed reflection on comments received.

a. Agreed factors

While discussing People domain factors identified in the Build stage, most of the participants from small, midsize and large cases and the SME implementer provided positive feedback. There some changes suggested by participants. When participants were asked about 'limited resources (people/skill)'; both large size participants acknowledged the relevance of this factor and stated that it is always hard to find a suitable resource (people) for specialised roles. They endorsed sub-factors of limited resources, such as 'trained business staff' stating that it was missed in their implementation and this was considered as a major weakness. They did obtain assistance from 'professional external contractors' to fill the knowledge gaps by partnering with Oracle consulting for project delivery. The large size participants also acknowledged having 'temporary staff to backfill existing business staff' for requirement gathering and eventual user acceptance testing activities.

In-house expertise analysis should be done in the Build stage. We didn't do it well for Campus Solutions implementation [ERP application first project] but I believe it was not bad for Finance implementation [ERP application second project]. In PeopleSoft financials implementation, staff from the business were employed in roles of business analysts and later returned back to their previous positions. This strategy really worked well for the finance team to retain the new sophisticated ERP application functional knowledge (LE-1).

Similarly, all small, midsize participants and the SME implementer also acknowledged the significance of 'limited resource (people/skill)' and its related sub-factors. SME implementer, being an implementation partner itself, was reluctant to comment on most of these factors but did acknowledge their significance and recommended these factors to be included in the model.

When case study organisations were asked about 'in-house expertise', both large size participants recognised its importance and stated that this factor would help to identify internal needs to be performed later in the Build or Construction stage. All small and midsize businesses and the SME implementer shared the view of having in-house expertise tested in the Build stage to identify any weaknesses within the team to be filled.

This (Build stage) is where we should be doing the in-house expertise analysis. It should be evidence based as by here you know who is doing what and how much in-house expertise we have to fill the holes with contractors. In our experience, DBA

(Database Administrators) were slightly more experienced, but the rest of the team was on the required level of expertise. Business Analysts were a bit inexperienced but they caught-up quickly (LE1- Technical Resource Manager).

In response to 'change management' and related factors, such as, 'staff attitude to change', 'management attitude' and 'organisational staff engagement', all participants acknowledged and recommended these factors to be considered in the Build stage. It was also mentioned by some midsize business representatives that even though there should be clear planning for change management upfront, realistically they may be entirely or partially experienced in the Construction stage or later at the Go live stage. In response to the change sub-factor 'business support for UAT team', LE2 stated that this should start in the Build stage, but based on their practical experience it typically did not. LE1 was of the opinion that this should be completed in the Construction phase or towards the end of Construction, immediately before User acceptance testing (UAT) starts.

None of this (change management) happened here (Build stage) but it should be done though. We should have engaged with people on change issues and managed the change strategy more effectively (LE2).

Similarly, in response to 'clarity in communication', both large size participants recognized the importance of this factor and indicated that it should be carried out by identification of internal needs and performed at a later stage. Similarly, both large size business participants identified 'communication transparency' as an important factor and identified that it was missed in the implementation and should have been considered in the Build stage. All small and midsize cases and the SME implementer acknowledged and endorsed these communication factors and recommended them to be considered in the People domain of Build stage.

In response to the factor 'internal and external team engagement', both large size participants, small and midsize cases and the SME implementer endorsed and recommended it to be considered in the Build stage of the model.

b. Modified factors

The only modification within the People domain of the Build stage was by MID-3, who suggested revising the wording of factor 'temporary staff to backfill existing business staff' to 'Backfill existing business staff'. MID-3 was of the view that the wording needed correction to

avoid mentioning temporary staff, rather raise a point for relevant action deemed necessary by midsize business management.

c. Additional factors

There were some suggestions made by participants in terms of relocating factors from other stages. LE1 (Technical Resource Manager) suggested relocating 'effects of managerial style' from the Organisation domain to the People domain within the Build stage. Similarly, LE2 (Testing Manager) suggested **new** factors such as, dedicated resources for testing (people/skill) with ability to fix defects in testing and plan for User Acceptance testing as part of testing strategy by clearly defining user acceptance testing requirements and recording its process appropriately. In addition, LE2 recommended revising 'training strategy', which was originally completed and communicated in planning stage, to be implemented in the Build stage. Based on LE2 (Testing Manager) experiences;

Training strategy was not completed until Build stage but it should have been completed in the Planning stage. Incentives for deliverables should plan for such strategies and happen in planning. Practically, once training strategy is complete, it should be executed accordingly in later stages of implementation, starting from Build (LE-2).

Similarly, MID-3 suggested a **new** factor 'staff training (technical and functional)' to be included within the 'limited resource (people/skill)' category. Furthermore, MID-3 argued in favour of People domain factors of the Planning stage, such as, 'team building' and 'team competence' to be included in the Build stage.

SME Implementer also suggested some **new** factors: 'skill match assessment' for an effective knowledge transfer', 'Establish training strategy' including build training plans and 'prepare for UAT' by defining UAT management strategy completed in the People domain of the Build stage. SME implementer further alluded that by establishing a UAT management strategy, it would help to encapsulate UAT related requirements in the Build stage and to be ready for performing UAT at the end of the Construction stage. Furthermore, the training needs analysis would enable identification of potential end users for training, who would later be used for UAT before the Go live stage.

SME implementer further provided recommendation for training needs analysis and training plan;

You must be developing your Training plan here. When your training plan is completed, you will deliver training as you go over. Develop relevant strategies upfront and when we go over, we execute them in Construct(ion) phase or as required. You should know how much your Delta is!! (SME Implementer)*

**(Delta is the difference between two versions of the applications. Delta records or uploads are the data of legacy system that gets loaded into SAP system after analysis of before, after and how to information)*

Finally, SME implementer's earlier suggestion to move end user expectation analysis from the Planning to the Build stage would help to streamline training and user acceptance testing, based on key stakeholders who would end up using the application. This would enhance the application acceptability and adoption by relevant teams for the collective success of a project.

d. Removed factors

Both LE1 (Technical Resource Manager) suggested removing the 'team management and control' factor to move to the Planning stage as an appropriate mechanism should be established earlier.

The team management and control structure should be in the Planning stage. (LE1)

LE2 (Testing Manager) seconded the opinion expressed by LE1, but in a different way;

The details of Team Management and Control structure should be refined here. In our experience; trying to work-out who looks after Analyst Programmers (AP) and how practically the project is being executed. In our project the issue was that the Technical resource manager was expected to manage AP and other technical resources. The project manager had the ownership of Data Conversion and functional teams. There was a little bit of un-surety about who is doing what. No clear definition of roles and responsibilities was an issue that should have been handled more carefully than it was done. I am not quite sure how effective this structure was and what impact this brought on the implementation (LE2).

Similarly both LE1 and LE2 suggested moving 'business support for UAT team' to the Construction stage. It was argued that it was too early to get into granular details of UAT, which should be optimally planned.

Furthermore, SME implementer and MID-2 suggested moving 'Trained business staff' later to the Go Live stage as this should be completed a few weeks before actual go live activities.

*Training of business staff is a little too early in Build I think. You need to establish a "Just in Time" training policy and I would recommend that it should be in Go Live stage or at the end of Construction stage when you could train up these end users well.
(SME Implementer)*

7.2.1.6 Section summary

Based on the previous discussion, it is concluded that all factors listed in the People domain of the Build stage were endorsed by case study participants. There were some instances where interviewees suggested relocating some factors to earlier stages of implementation including: 'trained business staff' sub-factor within 'limited resource (people/skill)' and 'business support for UAT team', a sub-factor of change management (to be relocated to the Construction stage); since the Build stage is too early for end users transferring knowledge and user acceptance testing. Similarly, it was suggested relocating 'team management and control' to the Planning stage. These suggestions are valid based on participant's experiences. However, considering the significance of early identification for resources (people/skill) and ensuring that staff identified for UAT, it was decided to keep these factors in the Design stage as well as a repeat of factors in the recommended settings provided.

There were also suggestions made to relocating existing factors from other stages/domain to the People domain of the Build stage: 'team building activities', 'team competence', 'effects of managerial style (*important +ve or -ve*)' and 'training strategies (*revision*)'. Furthermore, there were some **new** factors also recommended by some participants: 'dedicated resources for testing (people/skill)', 'an ability to fix defects in testing', 'skill match assessment for knowledge transfer', 'establish training strategy & build training plans', 'define UAT management strategy (in test strategy)', 'plan for user acceptance testing (UAT)' and 'revise end user expectation analysis'.

Considering the relevance of suggestions made by different interviewees, the modifications and new changes are reflected in the revised model accordingly. In regards to suggestions to remove factors, it was concluded that the management and control function remained to be a function throughout the Implementation and was not limited to the Planning stage. Similarly, the argument of relocating business support for UAT team to the Construction stage is noted, but early planning for UAT is considered vital. Finally, the suggestion of having trained

business staff in the Construction stage is accepted and therefore, repeated later - but the factor was not removed to maintain an early visibility of requirements for business staff training.

7.2.2 Summary of Build discussion (Blue Print/Detail Design stage)

At the start of the discussion, two case study participants suggested renaming the Build stage to something 'more meaningful'. Both argued that the sub-stages included in the 'Build' stage comprised *set-up, reengineer and system design*. These stages relate to functionally and technically designing the application. It was further argued that ERP applications are "out of the box" applications that are implemented and not developed. Therefore, "build" for a stage name could be misleading for midsize business leaders. It was suggested that the stage name should be reconsidered and proposed alternate options such as Functional Solution design stage or Detail design/blue print stage. The argument was accepted and the stage named was changed to "**Detail Design Stage**".

After discussing Build stage factors in the technology, organisational and people domain classifications, it can be concluded that the majority of the factors presented for discussion were endorsed by the case study participants. In addition, there were different technology factors suggested to be relocated into the Build stage including Data migration and Application integration related factors. However, some participants also argued for relocating the Planning stage related factors for Data migration and Application integration and move these to the Planning stage. Consequently, an analysis of factors was performed to consolidate related factors in a condensed manner to avoid repetition and for better sequencing. Similarly other **new** factors were added in the technology domain of the Build stage: 'identify training requirements (people factor)', 'build use case maps for design', 'show product in design' and 'customisation and development required'. In addition, there were suggestions to alter some factors: 'ERP compatibility' should be changed to 'ERP integration' and 'cost of implementation' should be changed to 'cost of Technology'. Similarly, case study participants stressed the need to establish 'Technical and infrastructure strategy' and 'establish testing strategy' for the ERP implementation. The associated sub-factors were also included.

Similarly, all of the organisational domain factors were endorsed by the case study participants. In addition, they suggested **new** factors: 'scope management', 'detail design – functional analysis', 'expanding on governing principles' for the project management control and 'business process change or customisation'. Likewise, people domain factors were also

endorsed by case study participants and they suggested some **new** factors for consideration: 'skill match assessment for knowledge transfer', 'establish training strategy & build training plans', 'dedicated resources for testing (people/skill)', 'An ability to fix defects in testing', 'Define UAT management strategy (in Test strategy)', 'plan for UAT' and 'revise "end user" expectation analysis'.

Table 7.2 shows the revised factors in the Build stage after the analysis of case study interviews. The new and altered factors are represented in the middle column, while the final column presents the pre-existing, amended and new factors in appropriate sequence, considering the broader discussion by the case study participants. Alterations are noted as follows:

- Removed factors noted with ~~strikethrough text~~;
- Text relocated from other stages or domains noted with green text.
- *New factors noted in Italics*

Table 7.2: Build stage factors after Case study discussion

Domains	Build stage (Before Case Study)	(New Factors or changes as recommended)	Build stage (After Case Study)
Technology factors	<ul style="list-style-type: none"> • ERP complexity; • In house expertise; • Cost of implementation • ERP compatibility issues with other applications • Development of a system design strategy • Business & Technology Issues 	<p>ERP Complexity considerations</p> <ul style="list-style-type: none"> ○ <Technical Lock Down ○ Vendor selection -> finalise technical requirements -> sizing -> procure servers and other technology> • <u>Data migration</u> <ul style="list-style-type: none"> ❖ Early development of strategy ❖ Strategy Communication ❖ Data quality analysis & data cleansing ❖ Establish requirements & Sampling • <u>Application integration (Identify)</u> <ul style="list-style-type: none"> • Identify systems for integration • ERP installation aspects • <i>Establishing of Testing strategy, testing processes, script creation and recording</i> • Cost of implementation • <i>Major impact in Stage 2, Business Analysis</i> • <i>Technical and infrastructure Strategy definition</i> • <i>Integration points – identify systems for integration</i> • <i>Build use case maps</i> • <i>Show product in design</i> • <i>Customisation and development required</i> • <i>Data migration – revision/update</i> • <i>Data Quality and Data Cleansing exercise – ongoing</i> • <i>Data structures establishment for migration</i> 	<ul style="list-style-type: none"> • ERP complexity; • In house expertise; <ul style="list-style-type: none"> • <i>Identify training requirements (people factor)</i> • Cost of implementation • ERP compatibility integration issues with other applications • Development of a system design strategy • Business & Technology Issues • <u>Technical and infrastructure Strategy</u> <ul style="list-style-type: none"> ○ <i>Technical Lock Down</i> ○ <i>Vendor selection -> finalise technical requirements -> sizing -> procure hardware/ servers and other technology</i> • <u>Data migration</u> <ul style="list-style-type: none"> • <i>Early development of strategy</i> • <i>Strategy Communication</i> • <i>Data quality analysis & data cleansing</i> • <i>Data migration – revision/update</i> • <i>Data structures establishment for migration</i> • <i>Establish requirements and sampling</i> • <u>Application integration (Identify)</u> <ul style="list-style-type: none"> • <i>Identify systems for integration</i> • <i>Integration points – systems for integration</i> • <i>ERP installation aspects</i> • <u>Establishing Testing strategy</u> <ul style="list-style-type: none"> • <i>Setup Test processes, script creation and recording</i> • <i>Cost of Technology implementation</i> • <i>Build use case maps for design</i> • <i>Show product in design</i> • <i>Customisation and development required</i> • <i>Information system function</i>
Organisational factors	<ul style="list-style-type: none"> • Cost of implementation <ul style="list-style-type: none"> ○ <i>Limited Resources (Budget)</i> • Situational Leadership issues • Issues due to Mergers/ Acquisitions • Cross dimensional factor impact • <u>Project Management:</u> <ul style="list-style-type: none"> ❖ <i>Project monitoring & control</i> ❖ <i>Risk Monitoring;</i> ❖ <i>Stakeholder expectation management</i> ❖ <i>Effective Communication & Coordination;</i> ❖ <i>Organisational change management</i> ❖ <i>Organizational resources management</i> • Organisational structure definition • Organisational Ideology; • Effects of managerial style 	<ul style="list-style-type: none"> • Stakeholder expectation analysis • Information system function • Effective organisational level communication and coordination • Organisational change management • <i>Scope management</i> • Detail Design: <i>functional details, processes, fit gap – business process functionality</i> • <i>Expand on Strategy for <u>Guiding Principles</u></i> • <i>Business process change or customisations</i> 	<ul style="list-style-type: none"> • <u>Cost of implementation</u> <ul style="list-style-type: none"> • <i>Limited Resources (Budget)</i> • Situational Leadership issues • Issues due to Mergers/ Acquisitions • Cross dimensional factor impact • <u>Project Management:</u> <ul style="list-style-type: none"> • <i>Project monitoring & control</i> • <i>Risk Monitoring;</i> • <i>Stakeholder expectation management</i> • <i>Effective Communication & Coordination;</i> • <i>Organisational change management</i> • <i>Organizational resources management</i> • Organisational structure definition • Organisational Ideology; • Effects of managerial style • Stakeholder expectation analysis • Effective communication and coordination • Organisational change management • <i>Scope management</i> • Detail Design: <i>functional details, processes, fit gap – business process functionality</i> • <i>Expand on Strategy for <u>Governing Principles</u></i> • <i>Business process change or customisations</i>

Domains	Build stage (Before Case Study)	(New Factors or changes as recommended)	Build stage (After Case Study)
People factors	<ul style="list-style-type: none"> • Limited Resources (People/Skill) <ul style="list-style-type: none"> ○ Trained business staff ○ Professional external consultants ○ Temporary staff to backfill existing business staff • In-house expertise • Team management & control • Change Management <ul style="list-style-type: none"> ❖ Business support for UAT team ❖ Staff attitude to change ❖ Management attitude ❖ Organisational Staff engagement • Clarity in communication • Communication transparency • Internal & external team engagement 	<ul style="list-style-type: none"> • <i>Skill match assessment – knowledge transfer – SME implementer</i> • <i>Establish training strategy -> build training plans – SME implementer</i> • <i>Team Building – MID-3 added</i> • <i>Team Competence – MID-3 added</i> • <i>Dedicated resources for testing (people/skill) – LE2,</i> <p><i>(An ability to fix defects in testing) – LE2</i></p> <ul style="list-style-type: none"> • <i>Effects of managerial style (important +ve or -ve) – LE1</i> • <i>Training strategies (execute later) – LE2</i> • <i>Plan for User Acceptance Testing as part of Test strategy – LE2</i> • <i>Prepare for UAT – define UAT management strategy – SME implementer</i> 	<ul style="list-style-type: none"> • Limited Resources (People/Skill) <ul style="list-style-type: none"> • Trained business staff • Professional external consultants • Temporary staff to backfill existing business staff • In-house expertise • Team management & control • Change Management <ul style="list-style-type: none"> • Business support for UAT team • Staff attitude to change • Management attitude • Organisational Staff engagement • Clarity in communication • Communication transparency • Internal & external team engagement • <i>Skill match assessment for knowledge transfer</i> • <i>Establish training strategy & build training plans</i> • Team Building activities • Team Competence • <i>Effects of managerial style (important +ve or -ve)</i> • <i>Dedicated resources for testing (people/skill)</i> • <i>An ability to fix defects in testing</i> • <i>Training strategies (revision)</i> • <i>Define UAT management strategy (in Test strategy)</i> • <i>Plan for User Acceptance Testing (UAT)</i> • <i>Revise “end user” expectation analysis</i>

7.2.3 Construction stage

(Configuration, Development, Testing)

For the purpose of this research, the Construction stage is comprised of the following three sub-stages;

- **Configuration:** includes configuring the application based on business needs
- **Development:** includes integration or customisation build/enhancements
- **Testing:** includes, system of the system once configuration/build completes

Table 7.3 present factors associated with the Construction stage; categorised in the Technology, Organisational and People domains. These factors are based on literature findings and modified in the focus group discussion.

Table 7.3: Construction stage factors before case study analysis

Factors for ERP adoption	Construction stage
Technology factors	<ul style="list-style-type: none"> • ERP installation aspects; • Cost of implementation • <u>Data migration</u> <ul style="list-style-type: none"> ❖ Early development of strategy ❖ Strategy Communication ❖ Data quality analysis & data cleansing • <u>Application integration</u> • Identify systems for integration
Organisational factors	<ul style="list-style-type: none"> • Limited Resources (Budget) • Issues due to Mergers/ Acquisitions (Impact of scope change on project) • Cross dimensional factor impact • Information System Function • Effective Communication & Coordination • Project monitoring & control • Organisational change management
People factors	<ul style="list-style-type: none"> • Limited Resources (Skill); • Staff Involvement; • In-house expertise; • Communication transparency • Internal & external team engagement • Dedicated resources for testing (people/skill) (An ability to fix defects in testing) • Key users involvement for testing

7.2.3.1 Suggestions to change the stage name

Similar to the earlier suggestions made by MID-3 and SME implementer regarding stage name change, for the Construction stage both MID-3 and SME implementer suggested to rename the Construction stage. For instance, MID-3 suggested renaming Construction as Implementation stage. It was further argued that the Implementation stage should comprise of sub-stages or activities as defined in the model, such as Configuration, Development and Testing. MID-3 was of the view that the word “Construction” for a stage could be misleading for midsize business leaders. It was argued that the intention should be to implement and not construct a pre-existing “off the shelf” ERP application. Furthermore, due to limited understanding of midsize business leaders, it would be appropriate to avoid such wording and maintain a business functional focus, enabling them to understand the benefits of “as is” product delivery rather than heavily constructed or customised applications.

Likewise, SME implementer suggested renaming the Construction stage as the Doing stage. SME implementer reiterated similar comments that the predefined sub-stages of “Construction” should be included in the “Doing stage”. For instance, development (as deemed necessary based on agreed scope and for integration), configuration and testing could be included.

You need to change the tone and reword the terminology for these factors in the Construction stage and make them in “Doing tone”, but keep the factors. All of them [midsize businesses] need to go up in the Planning and Design stages with the way they are presented in the Construction stage. Let’s assume we (SME implementer) are selected to implement a solution for a midsize business. We expect that there is pre-selection work already completed and we expect to start from;

- **Planning** stage – we will go through project plans, plan the technology and processes
- **Design** stage—we will design the solution functionally and technically as required by the customer
- **Doing** Stage – we do the project, we deal with technology, do the process and test it
- **Sign off** – we obtain sign off and we go live.

The first three could be considered as three major steps for every implementation. A lot of conversations in between but that’s how basically we do it. (SME Implementer)

Considering the arguments provided by MID-3 and SME implementer, a new name is adopted for the Construction stage to be "**Delivery Stage**". This change is reflected in the revised model.

7.2.3.2 Technology factors

Based on the literature review analysis and the first data collection stage (expert panel), the Technology factors in 'Construction stage' comprise:

- ERP installation aspects;
- Cost of implementation
- Data migration
 - Early development of strategy
 - Strategy Communication
 - Data quality analysis & data cleansing
- Application integration
 - Identify systems for integration

While discussing factors listed in the technology domain of the Construction stage, both large size and the small midsize business case interviewees provided comments based on their experiences and knowledge of the implementation. The response received from each case respondent was recorded in accordance with their recommendations to improve the model. Please, see Appendix 7B (12.4) for a detailed reflection on comments received.

a. Agreed factors

While discussing technology factors in the Construction stage, most of the participants from large, small and midsize businesses suggested planning and preliminary tasks for some factors to be created/ relocated in the earlier stages of implementation. In contrast, some participants suggested modifying factors or adding new ones with a 'tasks execution' theme.

When participants were asked about 'ERP installation aspects', LE1 and midsize participants³ agreed to have this factor included in the Construction stage for the purpose of ensuring that installation related activities have been completed and further enhancements or integrations could be performed. In response to the 'cost of implementation' factor, large size participants, SME and MID-2, MID-3 agreed to have cost revision in the Construction stage. From the discussion, it was recognised that there seems to be a collective agreement from most of the participants on conducting a cost of implementation revision in every stage of implementation.

In response to the 'data migration' relating factors, all participants including SME implementer suggested to relocate data migration planning and preliminary factors, including early development of strategy and strategy communication from the Construction stage to earlier stages. There were new factors suggested relating to data migration and data conversion activities delivery. When asked about the sub-factor data quality analysis & data cleansing, all midsize business participants endorsed its occurrence in the Construction stage and recommended it to be included in this stage of the model.

In response to the 'application integration' and related sub-factor 'identify systems for integration', it was indicated by LE1, SME implementer and MID-2 that the application integration planning starts from the Planning stage but is completed in the Construction stage. SME interviewee considered integration factor irrelevant, as they did not have any applications to integrate with their new ERP application.

b. Modified factors

All small and midsize businesses and the SME implementer were of the view that the Construction stage should only be considered for performing the work or 'Doing'/delivering/executing' activities and not for planning or strategizing activities. As already mentioned, SME implementer suggested renaming the Construction stage to '**Doing Stage**' for better understanding of its purpose.

c. Additional factors

LE1 suggested adding factors such as, 'business and technology issues' with their impact realisation in the Construction stage, while LE-2 suggested repeating business and technology issues from the Planning stage through to the Construction stage for an effective impact analysis.

In relation to data migration and conversion, there were recommendations made by different participants, including both large business participants (LE1 and LE2) suggested adding 'data migration and validation' continuation for 'data cleaning and process improvement' and 'ERP complexity' in the construction stage.

Data Quality analysis and cleansing should happen here (in the Construction stage). Based on our experience, I don't know whether the data conversion strategy was enough and was done until the last minute, which was not a good decision. (LE2)

Based on practical experience, MID-2 suggested adding a **new** factor 'data manipulation in CSV – after migration recharge' in the Construction stage. MID-3 argued that 'data migration' related sub-factors 'data quality analysis and data cleansing' should remain included and a **new** factor 'preparation of live data for testing' should also be added. MID-3 stated that performing comprehensive system testing with live system data after conversion migration would enable vigorous testing for system defects and it would be beneficial for the system stability before the Go live stage. SME implementer suggested **new** factors 'repetitive data cleansing cycles' and 'improve data quality and data structures' in the Construction stage.

In relation to testing and ensure quality in processes, LE2 (Testing Manager) suggested adding a **new** factor 'quality assurance and quality management', comprised of work flow management, testing and bug fixing mechanisms and should be introduced to this stage utilising a quality management tool such as Quality Centre (QC).

In our experience, Quality Centre (QC) was used to record test cases and effective tracking for work flow processes. Testing tools identification should happen in the Planning stage. What are you using and what will be used during the implementation and test planning should be done as part of the 'Planning stage'. It is all about quality assurance and quality management and it should be an integral part of the implementation. (LE2)

Similarly, MID-3 suggested **new** quality and testing related factors: 'ongoing SDLC process management', 'interface system information' and 'system testing' that should be further comprised of sub-factors 'prototyping for testing' and 'testing with live data'. According to MID-3 it would be critical to establish a robust testing process, controlled by release management processes to ensure that developments, integration and configurations are migrated throughout the System Development Life Cycle (SDLC) after stringent review and based on satisfactory standards.

In relation to system integration, MID-1 suggested adding a **new** sub-factor, 'effectiveness of inter-organisational system integration' to have a *sanity check* established post integration, to test the integration against established requirements. Furthermore, MID-3 suggested adding a sub-factor within application integration called 'integration testing'. The purpose of this factor is similar to that indicated by MID-1; to test the integrations for their effectiveness and workability.

Now you may start delivering it [integrated application] to the business for testing. You may also consider engaging with other Vendors, potentially based on the size of implementation for integration testing. It is also important to bring all players together to ensure that the application is ready to go live (MID-3).

Similar to above comments about system integration testing, SME implementer suggested adding a **new** factor called 'integrate and test integration'. This factor would serve the same purpose of having system integrations tested appropriately for the sanity check.

d. Removed factors

In the Construction stage, recommendations were made by participants to remove and relocate factors to earlier stages of implementation. It was a general argument to remove factors with planning or strategy content and relocate them to earlier stages of the model. Both large size interviewees argued that the Construction stage should only be considered for practical work delivery or performing activities and not for planning activities. Similarly, small midsize and SME implementer suggested removing 'data conversion' and 'application integration' related factors to the Build stage. The participants stressed the need for an early development of strategies and benefits of having data migration strategy, effective planning, data modelling, technical requirements for the data cleansing exercise to be performed before the Construction stage commences. According to LE1,

I am going to suggest that the data migration related activities should probably be started in the Build stage because we were continuously taking the data from the legacy system and doing full review of the data mapping across into Campus Solutions co-related fields. I also think that an early development of strategy and its communication should occur in the Build stage. Even data quality analysis should be done in Build along with data cleansing. All these processes once started in Build would carry across into the Construction phase for completion. Precisely the process of cleansing and migration should continue in the Construct(ion) stage and rest completed in the Build stage. Remember, we have to go through a number of iterations of migration before Go live. (LE-1)

SME did not comment on technical activities but valued the significance of having an early start in data conversion baseline activities, including migration processes, data trials and data cleansing to get the data ready for migration. MID-1, MID-2 and both large size participants suggested removing 'data migration' relating factors, 'early development of strategy' 'strategy

communication' and relocating them to the Build stage. MID-1 and MID-2 in contrast argued that 'data quality analysis and cleansing' should remain in the Construction stage.

In our experience, data migration strategy and planning was completed in the Planning stage. It was a bigger issue for us. I believe data quality and cleansing process should continue through the Construction stage. (MID-1)

According to SME implementer, data migration strategy and other components of data migration should go right up to the Planning stage. Later in the Design stage, they should get updated. Data cleansing is one of the major challenge for midsize companies. SME implementer stated that one company even started their data cleansing process 18 months before their project was completed. This approach was used by that company to get their data structures right and have everything aligned before final data was migrated into the ERP application. SME implementer further stated that the company management was unsure how to perform migrations but they simply completed data clean-up to have it ready and get it right for migration. Similarly, MID-2 shared their experience with data migration:

Data Migration should be done very early even start from the Pre-planning stage. We chose to manipulate the data in a format required to upload the data into the new application. It was good that we cleaned up the data way before and got rid of the rubbish. We took on setup of data migration and later the Implementation partner completed the upload. (MID-2)

LE2 also supported this notion and suggested;

Data Migration planning and strategy should start in the Planning stage. We should never leave these important things for later as they will have an impact on the project. We should plan ahead and draft a Data Migration strategy at a very early stage so that we know what kind of data we are dealing with. I anticipate it to be at a higher level. I think some strategy on data translation, extraction; validation and how the data will be migrated and how these processes will work must be appropriately recorded within this strategy. The more detailed information and actual Data Cleansing and process development should start in the Build stage and carry on to the Construct(ion) stage where it should be completed and then several times repeated for perfection. (LE-2)

Similarly, LE1 and LE2 suggested removing factors 'application integration' and 'identify system for integration' to the earlier Build stage and leaving practical completion of work in the

Construction stage. LE2 also suggested removing 'ERP installation aspects' to the earlier Build stage, as all technology installation and operational activities should have been completed before development activities should start.

ERP installation aspects relate with type of SDLC environments required for implementation. In this stage we are pretty much talking about doing stuff and not planning. Clearly it should be identified earlier that what environments are required and what workflow would be before the Construction stage would start. (LE-2)

MID-1 acknowledged the practical completion of integration work in the Construction stage but suggested removing 'identify systems for integration' to the Build stage and suggested a **new** integration sub factor 'perform application integration' in the Construction stage. MID-2 reported an issue experienced at the implementation relating to their integration experience, referencing 'a recharge module' required to be integrated with the core ERP application and neither vendor nor implementer had a solution. Therefore, there was an extreme nervousness felt towards the end of the project at Go live. MID-2 argued that, had these issues been identified earlier; the work could have been completed in a smoother fashion. SME reported that they did not integrate with any external application, yet envisaged issues to be considered before reaching the Construction stage.

Moreover, MID-1 and SME-Implementer suggested relocating 'ERP installation aspects' to the Build stage, 'Cost of implementation' to the Planning stage and the cost milestones should only be considered for tracking purposes.

7.2.3.3 Section summary

It can be concluded that most of the factors identified in the Technology domain of Construction stage were suggested to be removed/relocated to other stages of the implementation. The sub-factors identified within 'data migration' and 'application integration' were also relocated to the earlier stages, except the data migration sub-factor 'data quality analysis and data cleansing' in the Construction stage. It was noted from the discussion that Construction stage factors should primarily be in execution mode; where work gets practically performed, rather than planning or strategizing related factors.

Subsequently, the case study participants suggested new sub-factors for both data migration and application integration relating to the Construction stage. For instance, the new factors for data migration reported included: 'repetitive data cleansing cycles', 'improve data quality and

data structures, prepare live data for testing, data manipulation in CSV, having data ready for import, and data migration and validation (early start: migration trial and cleansing process to get data ready for system). Similarly, there were new 'application integration' factors relating to task execution specified by participants: interface system information, integrate and test integration, perform application integrations, perform system integration, integration testing, and effectiveness of inter-organisational system integration.

In addition to the above, case study participants also suggested relocating some other factors in the technology domain of the Construction stage along with proposing some new factors. For instance, it was argued to include: business & technology Issues (full impact) and ERP complexity factors, as the impact of these factors on implementation would be clearly apparent and having them analysed would be beneficial for midsize businesses. Furthermore, some new factors were also suggested by the interviewees: quality assurance and quality management and its sub-factor work flow management, testing, bug fixing, tracking, Quality Centre (QC), ongoing SDLC process management, system testing and prototyping for testing and testing with live data.

Considering the arguments from a wide range of midsize and large size case study interviewees, all non-relevant factors were removed from the model. In addition, new factors suggested by different participants were added and these changes are reflected in the revised model.

7.2.3.4 Organisational factors

Based on the literature analysis and the first data collection stage (expert panel), the Organisational factors in 'Construction stage' comprise:

- Limited Resources (Budget)
- Issues due to Mergers/ Acquisitions (*Impact of scope change on project*)
- Cross dimensional factor impact
- Information System Function
- Effective Communication & Coordination
- Project monitoring & control
- Organisational change management

Please, see Appendix 7B (12.4) for a detailed reflection on comments received.

a. Agreed factors

While discussing organisational factors in the Construction stage, a mixed response was received. When considering the 'limited resources (budget)' factor, all participants acknowledged experiencing this factor and recommended a stage-wise budgetary review, including in the Construction stage. It was reported by most of the small midsize representatives that they had a fixed budget for their implementations and had to deliver within their allocation. SME interviewee reported that they had budgetary slippage due to some technical issues. The implementation partner had to spend extra time to resolve the problem. It was reported that MID-1 had \$65,000 allocation, MID-2 \$65,000, SME had \$65,000 but spent around \$80,000 and MID-3 spent \$2.0M due to their size and lack of off the shelf packages available at the time of their implementation.

When participants were asked about 'issues due to mergers/acquisitions', similar to the earlier response, most of them considered it irrelevant. In contrast, SME implementer endorsed this factor to remain in the Construction stage and was of the view that when a small midsize business mergers or faces a takeover challenge, the decision will have significant implications on an existing ERP implementation project scope. Hence, the impact should be appropriately analysed and vigilantly monitored.

If CEO comes up two weeks in the Build stage and tells us that the company is bought by another company, we need to know what changes are likely to occur as part of the project build. The potential impacts of merger on a project could be minimal OR a complete redesign!! (SME implementer)

Similarly, when participants were asked about the 'cross dimensional impact' factor the response was consistent with what was received in the earlier stage. None of the participants understood the relevance of the cross dimensional factor and were unable to relate it with their practical experiences. Only SME implementer acknowledged and endorsed this factor and was of the view that the organisation should have 'watch, train and monitor' as a strategy to mitigate potential risks associated with external factors.

In response to 'information system function', LE1 related this factor with user acceptance testing (UAT) validation, while small and midsize case participants (MID-2 and MID-3) acknowledged and endorsed this factor for the Construction stage.

When participants were asked about 'effective communication and coordination', LE1, small and midsize participants acknowledged its significance in the Construction stage and recommended it to be included. In contrast, LE2 was of the view that this factor should be relocated from the Construction stage to the earlier stages of the model.

In response to 'project monitoring & control', all participants considered it to be relevant and recommended the factor to be included in the Construction stage. MID-3 was precise in the response by stating that this factor should relate with the project reporting and must be considered throughout the implementation stages.

Similarly, when participants were asked about 'organisational change management', both large business participants along with MID-2 and MID-3 acknowledged experiencing organisational change management issues, while MID-1, SME and SME implementer recommended this factor to be considered in the Construction stage. Furthermore, SME implementer specified that in the Construction stage, change management, monitoring and execution is relevant and change planning should be carried out in the early stages of implementation. Similarly, LE2 suggested that in the Construction stage, organisational change monitoring would be more relevant than change management. Hence the factor should be changed accordingly.

b. Modified factors

The only change in organisational factors was suggested by LE2 who recommended replacing organisational change management with organisational change monitoring as the strategy.

c. Additional factors

There were two factors recommended, one each by SME implementer and MID-3. SME-implementer suggested adding a **new** factor 'cost tracking and updates' as an organisational factor in the Construction stage for effective project expenditure management. SME implementer argued;

Tracking/monitoring of cost and its management against baseline should be performed in Construction. In this stage, I consider planning or strategizing or changing the baselines as too late. (SME implementer)

You have to ensure that in your Planning and Design phases, everything that you are supposed to track or monitor must be clearly defined, understood and recorded. There

might be deltas and things might pop-up (added change requiring further development or enhancement) therefore a clear strategy to manage these situations should be drafted. We call it issues management and the issue management capability must be there, illustrating how are we tracking progress against the scope and expectations (SME implementer).

Similarly, MID-3 proposed a new factor budget standing actual forecast and estimated expenditure based on effective progress tracking and reporting. According to MID-3,

A week based review of the progress should be done and reported back to your steering committee. The reporting should include budget standing actual forecast and estimated expenditure for suitable tracking of expenditure (MID-3)

d. Removed factors

LE2 suggested removing two factors, information system functions and effective organisational level communication and coordination. It was suggested by LE2 that these factors should be moved to earlier stages of the implementation.

I think information system function should be in the Build stage. It relates to how the system will act and I think it should be in Build. Similarly, communication and coordination should go up with maybe organisational change management. (LE2)

7.2.3.5 Section summary

Most of the factors identified in the organisational domain of the Construction stage were endorsed by the case study participants. In addition, some participants related existing factors with their experience. For instance: in response to the factor 'information system function' a participant related it with UAT validation and another suggested that it be relocated to an earlier stage of the implementation.

Similarly, project management sub-factor 'project monitoring and control' was related with project reporting and the 'organisational change management' sub-factor was related to project monitoring and control. A consistent *no response* received on 'issues due to mergers and acquisitions' factors. However, SME implementer recommended this factor due to likely impact on project scope and delivery expectations.

In addition to the above, there were two new factors suggested by experts: 'cost tracking and updates' (*budget standing actual forecast and estimated expenditure*) was recommended as an ongoing cost management factor and '*impact of scope change on project*' was also suggested for effective project scope management.

Considering the relevance of new factors suggested by participants along with relocated factors, the suggested changes were accepted and reflected in the revised model accordingly. In relation to the suggestion of removing factors information system functions and effective organisational level communication and coordination, a wide range of midsize business interviewees acknowledged the significance of these factors' existence in the Construction stage. It was therefore decided not to accept the argument to remove these factors in the model.

7.2.3.6 People factors

The People factors in the 'Construction stage' comprised the following factors after the first phase of data collection;

- Limited Resources (Skill);
- Staff Involvement;
- In-house expertise;
- Communication transparency
- Internal & external team engagement
- Dedicated resources for testing (people/skill)
(An ability to fix defects in testing)
- Key users involvement for testing

Please, see Appendix 7B (12.4) for a detailed reflection on comments received in relation to people factors in construction stage.

a. Agreed factors

While discussing the people domain, most of the factors were acknowledged and endorsed by the small, midsize and large size participants. For instance, when case study interviewees were asked about 'limited resources (skill)', participants acknowledged experiencing this factor and recommended it to be included in the model for consideration. MID-3 related this factor with the user acceptance testing (UAT) and the readiness of businesses to perform UAT. It was urged that a business should consider UAT staff training as an important factor that must

be completed. LE2 shared some insight on their limited resource issues faced in implementation, especially in relation to the ability of staff to be proficient at a certain degree to perform duties diligently and also the level of staff turnover.

By this time (Construction stage) the project team should be “Storming and performing”. We had Oracle consulting as a major technical resources provider. Due to limited resource skills, our testing team was struggling to understand the configurations and whether they are performed the right way and to validate whether the application is behaving normally. It was a difficult situation where a lot of staff stumbling trying to understand the right ways through, bits and pieces were being developed onsite and overseas and integrated to function as a single piece (LE-2).

The above comment from LE-2 clearly articulates the difficulties they were facing due to lack of expert knowledge in-house and relying heavily on external contractors (onshore and offshore) to provide specialised services.

MID-1 stated that in their project, skill was not considered a major issue, rather the limited resources (time and staff). According to MID-1,

We felt that we were running out of time and the contractors were running out of time as well. That was a huge issue at the time. To me, change relates to people or time instead of skills. (MID-1)

According to SME implementer, in-house experience is relevant to midsize businesses implementing ERP applications. According to SME implementer, these businesses need to be clear on:

How much knowledge transfer they expect? How much training they require to be delivered by the vendor/reseller? Are they [contractors] just engaged to deliver project outcomes and your guys [midsize business staff] allocated to the project are actually sitting and playing cards? (SME implementer)

When participants were asked about the factor ‘staff involvement’, all participants acknowledged its relevance and affirmed experiencing it in their implementation.

In response to ‘in-house expertise’, the participants considered it important and relevant. LE2 related this factor with the gradual performance improvement of staff as they receive on-job training. SME implementer related this factor with knowledge transfer to the relevant business

units (staff) who are expected to perform business functional responsibilities after Go live. Similarly SME, MID-1 and MID-3 acknowledged the significance of in-house expertise and highlighted its importance in relation to post implementation transition. Furthermore, SME implementer shed some light on the significance of knowledge transfer and stated that:

It is indeed really important to ensure that the staff allocated to the project by the [midsize] company are performing some work and gaining the knowledge experience. There is always a lot of talk for knowledge transfer and we expect companies to nominate people who they want to be trained by us as part of this process. If the required personnel are not available then who will be backup for them? All these sort of strategies needs to discussed and finalised upfront and understood by [midsize] companies (SME implementer).

In relation to 'communication transparency', the large, small and midsize business representatives acknowledged its importance and relevance to the Construction stage. SME implementer emphasised that in this stage, the factor should only relate to performing the activity and not to planning or strategizing. LE1 shared:

In my experience, in some areas communication was transparent; however I would not say it was that transparent in all related areas across functional, technical and other arms therefore, we had issues. (LE-1)

Similarly, according to MID-3, communication strategies are relevant and important for the project:

Communication strategy becomes relevant here (in the Construction stage), as previously you might have been doing some internal communication but now external communication becomes relevant. Suppliers, partners and all other parties relevant to the business needed to start engaging with them in this stage for identification of training requirements and how much training will they need. Under change impact strategy it should be considered (MID-3)

Consistent with the earlier feedback, when asked about the 'internal & external team engagement' factor, all large, small and midsize case study participants recognised the significance of internal and external teams' engagement and endorsed it to be included in the model. LE1 provided an insight on team engagement;

We had heavy involvement of staff engagement, both internal and external. Everybody was involved in the project and took the ownership and attempted to deliver results. Everybody worked as a team to achieve the outcomes, formed a very cohesive team (LE-1)

Similarly SME implementer stated:

Yes, in the Construction stage we were actually engaged to perform work. In previous stages of Planning and Design, teams were expected to discuss details and select options but here [in the Construction stage] we actually do the work. (SME implementer)

In response to 'dedicated resources for testing (people/skill)', all interviewees endorsed and recommended this factor to be considered in the Construction stage. SME implementer related this factor with the requirements for user acceptance testing (UAT). All small and midsize business participants acknowledge the significance of having staff with the ability to fix defects. Most of the midsize representatives expressed their inability to source staff internally for defect fixing and relied heavily on contracting partners to provide specialised resources:

We did consider allocating dedicated resources for testing. The development was completed by our contractor but time was a major challenge. The timeframe was very tight and we had limited in-house expertise. We didn't know much about applications so heavily relied on the external contractor to provide specialised assistance. If you allocate resources without appropriate knowledge and skills, that means nothing. It was a major challenge faced by us. I consider this a weakness in the project that should not have happened. (MID-1)

SME implementer stated that the knowledge of the application would be exceptionally important for UAT. Therefore, businesses should consider allocating dedicated resources for testing and prior testing could start those staff members should be trained appropriately. Similarly, availability of technical and functional internal resources to test the application and an ability to fix defects would be important for timely completion of the project. SME implementer seconded the impression that implementation partner assistance would be required by midsize businesses to deliver technical expertise for defects rectification:

It is important for a business to decide on resources in the early stages of testing. Also, the testing strategy must be established, explaining how testing will be performed and

by whom. The internal teams won't be able to fix the defects and they will only be used to identify them during their testing round (SME Implementer)

Similarly, MID-3 states that:

Limited resources will always be a major challenge, especially for the small and midsize organisations, especially when their core task is testing; the resourcing will be a major challenge. It would be critical for (a) business to accept and sign off on and release their staff for user acceptance testing (UAT) etc. It is also advisable to provide four weeks' notice before a resource gets engaged. Defects resolution and fixing on the fly would need external help. (MID-3)

Similarly, SME implementer specified a need for 'allocating dedicated business staff for UAT (people/skill)' with identification of people and, later in the Construction stage, utilising their services to perform UAT. For that matter 'key user involvement for testing' is considered important by LE1 and all small midsize participants. SME implementer and MID-3 related these factors with UAT, similar to LE1 and considered these significant for the project and meeting stakeholder expectations.

Planning for UAT should start earlier and business support should be provided. We didn't do enough and should have expanded that on business support for UAT. The experience with UAT was that the application was presented to the audiences demonstrating how the system works and expected to be tested. If they were planned appropriately in the Build stage, it would have been beneficial in the Construct(ion) phase. (LE-1)

b. Modified factors

MID-3 suggested including some sub-factor within system testing such as, 'resource plan for testing (people)', and 'dedicated resource for testing (people and skills) with ability to fix defects etc.

c. Additional factors

While discussing people factors in the Construction stage, there were several recommendations made to add **new** or relocate existing factors within the model. For instance, LE1 and LE2 suggested relocating people factors change management (on people) and its

related sub-factor business support for UAT team (ongoing) from the Build stage to the Construction stage.

Similarly, LE2 also suggested relocating the people factor user support base for application from the Planning to the Construction stage and recommended a **new** factor 'perform user acceptance testing from identified staff' be included within the people domain of the Construction stage.

In our experience, UAT was handled by the Project Manager. The process of identification and performing UAT was poorly done. QC (Quality Centre) was used to record test cases and effective tracking for work flow processes. The testing tools identification should have happened in the Planning stage. All planning related aspects should be sorted as part of planning. As things were not properly planned and done upfront, my belief is that UAT never got it through (LE-2).

SME-implementer suggested adding a **new** factors 'end user engagement' and 'UAT management perform UAT' in the Construction stage.

We call this factor (Key users for UAT) UAT management. For this you need to ensure that in the early stages of implementation, UAT tasks are prepared and then the UAT management comprised of actual performing of UAT (SME implementer).

Likewise, MID-3 suggested a **new** factor 'operational implication analysis' with its sub-factors 'succession planning', knowledge transfer strategy (vision) and suggested to relocate 'knowledge management for ERP post implementation maintenance and support' from the Go live stage to the Construction stage. Similarly, SME implementer argued that the training of end users for successful knowledge transition is critical for post implementation support.

Training of business staff is a little too early in Build I think. You need to establish a "Just in Time" training policy and I would recommend that it should be in the Go Live stage or at the end of the Construction stage when you could train up these end users well. (SME Implementer)

Furthermore, MID-3 recommended to establish system testing as a core process within the Construction stage and argued adding a **new** factor, system testing and sub-factor resource plan for testing (people). Furthermore, MID-3 recommended that factors key users

involvement for testing and dedicated resource for testing should be relocated within system testing.

In addition to allocating resources for the defect resolution process, SME implementer suggested establishing a setup defect management triage process for defect prioritisation, resolution and effective management.

For triage process – possibly we have first point of call in the business internal IT-technical staff to fix once defects are identified. If internal team couldn't able to resolve those defects, then they should get allocated to contractor staff. Using Business process specialists with functional area knowledge and experience with the product in the business for functional defect resolution (SME implementer)

According to MID-3, communication is the key to success of a project and in this critical stage of implementation, the factor internal and external communication factor should be expanded to include communication to supplier and partners as well.

d. Removed factors

According to LE2, the factor 'dedicated resources for testing' (with an ability to fix defects) should be relocated to the Build stage for early planning before its execution in the Construction stage.

Regarding allocating dedicated people for training and identifying someone with an ability to fix defects, I think we had that skill level within the organisation and a dedicated developer performed these set of activities. I think this should be part of (the) Build process, not here. While designing the system, we should have functional design documents and technical design documents to articulate development requirements. Planning for testing, test scripts and test cases and understanding the design documents, their translation relates to Design stage activities (LE2)

7.2.3.7 Section summary

All of the factors were endorsed by the case study participants. In addition, experts suggested adding factors from other stages: 'user support base for application (done later)' and 'internal & external communication (supplier/ partners)'. In addition, new people factors were also suggested by interviewees; 'business staff training (functional and UAT)' was suggested as a sub-factor of predefined 'limited resources (skills)' factor. A new factor called 'system testing'

was suggested and also its sub-factors: 'resource plan for testing (people)' and 'setup defect management triage process'. Furthermore, it was argued that the 'dedicated resources for testing' factor should be changed to 'allocate dedicated resource for testing'.

Similarly, participants suggested adding new factors called 'end user engagement' along with three other factors and their associated sub-factors. From the other three new recommended factors; 'perform change management (on people)', and its sub-factors such as, 'business support for UAT team (on going)' and 'impact of change on staff', was related with people change and effective user acceptance testing management. Similarly, other new factors suggested were 'perform user acceptance testing' factor and its sub-factors, 'identify staff for UAT and train', 'perform UAT from identified staff' and 'UAT management' were related to the UAT process management, resourcing and training requirements. Finally, an 'operational implication analysis' factor was suggested along with related sub-factors including: 'succession planning', 'knowledge transfer strategy', and 'knowledge management for ERP maintenance/support' and these factors were related to the broader impact of ERP and its requirement knowledge transfer requirements.

Considering the relevance of suggestions made by different case study interviewees, the new factors along with changes suggested were accepted and reflected in the revised model. In regards to the suggestion of removing the 'dedicated resources for testing' factor, other interviewees (MID3, SME implementer) stressed the need to identify and allocate dedicated staff for testing. In the Construction stage, actual testing occurs and if resources have not been identified earlier, it would be important to include this factor as a check-list item to complete. Therefore, the researcher decided not to accept the suggestion and not to remove the factor.

7.2.4 Summary of Construction discussion

(Implementation/ Doing stage)

When factors associated with the Construction stage were discussed, MID-3 and SME implementer suggested renaming the stage. MID-3 argued that the word "construction" would be misleading for the midsize business leaders who presumably will have minimal understanding of ERP implementation. It was suggested by MID-3 to consider renaming this stage as "Implementation stage", as the sub-stages included in this stage comprise of configuration, development and testing. Similarly, SME implementer suggested renaming the

stage to “Doing Stage” in which practical work is completed and delivered. Considering the arguments provided by both, MID-3 and SME implementer, the researcher has decided to adopt a new name for the Construction stage to be “**Delivery stage**”, because using implementation for a stage name would be confusing to differentiate between implementation as process and implementation as a stage name.

All factors with a planning or strategy development focus should be removed and relocated to the earlier stages of implementation. This includes a significant revision of factors associated with ‘data migration’ and ‘application integration’. In addition, the ‘ERP installation aspects’ factor along with other technical and project related pre-requisite factors should be removed. Moreover, there were a significant number of new factors with activity execution focus suggested by the participants. This includes factors relating to performing data conversion, data cleansing processes, data migration, validation and starting data migration trials early. Similarly, factors associated with application integration or interfacing related execution factors such as, perform the integration, test integration, analyse effectiveness of integration amongst other organisational applications and so forth were also suggested. The case study participants also highlighted the need for quality assurance processes and management of quality in SDLC management as well as code migration, work flow management, prototyping and testing the application.

In relation to the organisational factors, the focus of discussion remained on needs for user acceptance testing (UAT) and effective management of the UAT. In addition, reporting and project monitoring, cost tracking and impact of change in scope on the project were also identified as new factors for consideration. In terms of people domain factors, apart from endorsing the predefined factors, the participants stressed a need for effective change management on people. In addition, system testing deliverables, identification and training of business staff and recruiting staff for UAT, performing UAT, the operational impact analysis and knowledge transfer were some of the factors discussed and feedback provided.

Table 7.4 presents the revised factors in the Construction stage after case study interviews analysis.

Table 7.4: Construction stage factors after Case study discussion

Domains	Construction stage (Before Case study)	(New factors or changes as recommended)	Construction stage (After Case study)
Technology factors	<ul style="list-style-type: none"> • ERP installation aspects; • Cost of implementation • <u>Data migration</u> <ul style="list-style-type: none"> ❖ Early development of strategy ❖ Strategy Communication ❖ Data quality analysis & data cleansing • <u>Application integration</u> • Identify systems for integration 	<ul style="list-style-type: none"> • <i>Integrate and test integration</i> • <i>Integrate Applications (Recharge module integration, SAP couldn't do it – big issue)</i> • <i>Perform System integration</i> • <i>Integration Testing</i> • <i>Business & Technology Issues (full impact)</i> • <i>Data migration & Validation (doing),</i> • <i>ERP complexity;</i> • <i>Quality Assurance and Quality Management (work flow management, Testing, bug fixing, Tracking, QC)</i> • <i>Perform App Integration</i> • <i>Effectiveness of inter-organisational system integration</i> • <i>Early start: Migration trial and cleansing process to get data ready for system</i> • <u>Data migration</u> – practically performing, doing <ul style="list-style-type: none"> ○ <i>Repetitive data cleansing cycles</i> ○ <i>Improve data quality and data structures</i> ○ <i>Prepare live data for testing</i> ○ <i>Data manipulation in CSV – after migration recharge</i> • <i>Ongoing SDLC process</i> • <i>Interface system information</i> • <i>System Testing</i> <ul style="list-style-type: none"> ○ <i>Prototyping for testing</i> ○ <i>Testing with live data</i> 	<ul style="list-style-type: none"> • ERP installation aspects; • Cost of implementation (Revised only) • <u>Data migration</u> – <i>Practically performing or doing</i> <ul style="list-style-type: none"> ○ Early development of strategy ○ Strategy Communication ○ <i>Data quality analysis & data cleansing</i> ○ <i>Repetitive data cleansing cycles</i> ○ <i>Improve data quality and data structures</i> ○ <i>Prepare live data for testing</i> ○ <i>Data manipulation in CSV, having data ready for import</i> ○ <i>Data migration & Validation</i> ○ <i>Early start: Migration trial and cleansing process to get data ready for system</i> • <u>Application integration</u> <ul style="list-style-type: none"> ○ <i>Identify systems for integration</i> ○ <i>Interface system information</i> ○ <i>Integrate and test integration</i> ○ <i>Perform Application integrations</i> ○ <i>Perform System integration</i> ○ <i>Integration Testing</i> ○ <i>Effectiveness of inter-organisational system integration</i> • <i>Business & Technology Issues (full impact)</i> • <i>ERP complexity</i> • <i>Quality Assurance and Quality Management</i> <ul style="list-style-type: none"> ○ <i>Work flow management, Testing, bug fixing, Tracking, QC</i> • <i>Ongoing SDLC process management</i> • <i>System Testing</i> <ul style="list-style-type: none"> ○ <i>Prototyping for testing</i> • <i>Testing with live data</i>
Organisational factors	<ul style="list-style-type: none"> • Limited Resources (Budget) • Issues due to Mergers/ Acquisitions (<i>Impact of scope change on project</i>) • Cross dimensional factor impact • Information System Function • Effective Communication & Coordination • Project monitoring & control • Organisational change management 	<ul style="list-style-type: none"> • <i>Cost tracking and updates</i> • <i>Impact of scope change on project</i> 	<ul style="list-style-type: none"> • Limited Resources (Budget) • Issues due to Mergers/ Acquisitions (<i>Impact of scope change on project</i>) • Cross dimensional factor impact • Information System Function (<i>User acceptance testing validation</i>) • Effective Communication & Coordination • Project monitoring & control (<i>Reporting</i>) • Organisational change management (<i>Monitoring</i>) • <i>Cost tracking and updates</i> • <i>Impact of scope change on project</i>

Domains	Construction stage (Before Case study)	(New factors or changes as recommended)	Construction stage (After Case study)
People factors	<ul style="list-style-type: none"> • Limited Resources (Skill); • Staff Involvement; • In-house expertise; • Communication transparency • Internal & external team engagement • Dedicated resources for testing (people/skill) <i>(An ability to fix defects in testing)</i> • Key users involvement for testing 	<ul style="list-style-type: none"> • <i>Staff Training (functional and for UAT)</i> • <i>identify people in past and now using them to perform testing</i> • <u>Change Management (on people)</u> (perform CM) <ul style="list-style-type: none"> ○ Business support for UAT team (on gong) • <i>User Acceptance Testing – identify staff and train</i> • <i>User support base for application (done later)</i> • <i>Perform User Acceptance Testing from identified staff</i> • <i>End user engagement</i> • <i>UAT management – perform UAT</i> • <u>System Testing</u> <ul style="list-style-type: none"> ○ <i>Resource plan for testing (PEOPLE)</i> ○ <i>Key users involvement for testing</i> ○ <i>Dedicated resources for testing</i> • <i>Impact of Change on staff</i> • <i>Internal & external communication (supplier/ partners)</i> • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ <i>Succession planning</i> ○ <i>Knowledge management for ERP maintenance/support</i> 	<ul style="list-style-type: none"> • <u>Limited Resources (Skill);</u> <ul style="list-style-type: none"> ○ <i>Business staff training (functional and for UAT)</i> • <i>Staff Involvement;</i> • <i>End user engagement</i> • <i>In-house expertise; (gradually improvement)</i> • <i>Communication transparency</i> • <i>Internal & external team engagement</i> • <u>System Testing</u> <ul style="list-style-type: none"> ○ <i>Resource plan for testing (PEOPLE)</i> ○ <i>Setup defect management triage process</i> ○ <i>Allocate dedicated resources for testing (people/skill)</i> <i>(An ability to fix defects in testing)</i> ○ <i>Key users involvement for testing</i> • <u>Perform Change Management (on people)</u> <ul style="list-style-type: none"> ○ <i>Business support for UAT team (on going)</i> ○ <i>Impact of Change on staff</i> • <i>User support base for application (done later)</i> • <u>Perform User Acceptance Testing</u> <ul style="list-style-type: none"> ○ <i>Identify staff for UAT and training</i> ○ <i>Perform User Acceptance Testing from identified staff</i> ○ <i>UAT management</i> • <i>Internal & external communication (supplier/ partners)</i> • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ <i>Succession planning</i> ○ <i>Knowledge transfer strategy</i> ○ <i>Knowledge management for ERP maintenance/support</i>

7.2.5 Go Live stage

The Go live stage comprises of a transitional process or a period that starts immediately before the actual go live activities commence and finishes when the go live system transition has been completed and the new system is available to use.

Table 7.5 presents the factors associated with the Go live stage and are categorised in Technology, Organisational and People domains.

Table 7.5: Go Live stage factors before case study analysis

Factors for ERP adoption	Go Live stage
Technology factors	<ul style="list-style-type: none"> • ERP implementation issues (Update); • Business & Technology Issues (Update); • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ Knowledge management for ERP maintenance/support ❖ Effectiveness of inter-organisational system integration
Organisational factors	<ul style="list-style-type: none"> • Strategic Management Issues (Update); • Change strategies (Update); • Risk Management (Update); • Effective Communication • Project monitoring & control • Organisational change management • <u>Operational implication analysis</u> <ul style="list-style-type: none"> • ERP business functional impact
People factors	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • End user engagement • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ Succession planning ❖ Knowledge management for ERP maintenance/support

7.2.5.1 Suggested change to stage name

SME implementer once again suggested renaming the 'Go Live' as the 'Sign-off' stage. It was argued that there are critical activities leading to 'Go live' including obtaining sign-off from business, completing go live drills and starting the go live process. It was further added that the 'go live' activities should only be used to record lessons learnt from the implementation.

7.2.5.2 Technology factors

The Technology factors in 'Go Live stage' comprised:

- ERP implementation issues (Update);
- Business & Technology Issues (Update);
- Operational implication analysis
 - Knowledge management for ERP maintenance/support
 - Effectiveness of inter-organisational system integration

Please, see Appendix 7C (12.5) for a detailed reflection on comments received.

a. Agreed factors

When the case study participants were asked about the listed technology factors, most of them accepted them to be included in the Go Live stage. For instance, when interviewees were asked to comment on ‘ERP implementation issues (Update)’, both large size participants (LE1 and LE2) along with all small and midsize business representatives acknowledged the significance of this factor and endorsed it to be included in the Go live stage.

Based on LE1 and LE2’s experience, issue logs should be maintained throughout the project to record lessons learnt from implementation experiences, business or technology related issues and any operational handover issues faced by the business. Similarly, the small and midsize business case representatives confirmed that there was no predefined mechanism to record lessons learnt but the impacts of ERP implementation was felt significantly throughout the organisation. MID-1 provided some insight on their Go live experience and state:

We were using an old system and at the Go live stage it was end of the financial year. We completed our statutory reports and knew what to close and report back to the tax office. We had to have new application work at least with a baseline to deliver the required reports. We planned well ahead but still at the Go live stage, we strike problems. Eventually we remained affected by those issues even 12 months after Go live (MID-1)

MID-2 also shared some Go live experiences and information on issues they faced at the Go live stage. It was stated that during Go live activities, while performing application sanity check for the ‘financial management application’, the figures were not balancing and urgent assistance was required to fix that problem. It was stated that the migration from legacy payroll to the new payroll, payable and receivable modules were working correctly and that single issue created massive anxiety and stress for the entire team.

Similarly, when participants were asked about 'business and technology issues (update)', LE2 related it to hand-over and transition management, while both large size participants endorsed this factor to be considered at the Go live stage. Similarly SME, MID-2 and MID-3 acknowledged experiencing business and technology issues and recommended other midsize businesses to consider recording relevant issues in the Go live stage.

When participants were asked about 'operational implication analysis' and the related sub-factors, such as, knowledge management for ERP maintenance/ support and effectiveness of inter-organisational system integration, both large size participants and MID-3 recognised its significance and stressed the need for appropriate knowledge transfer strategy, succession planning and the ability of the operational staff to manage and maintain the application after Go live is completed. LE2 stated that in their experience, post implementation transition took around 12-18 months and they had to vigilantly monitor technology outcomes as well as manage change related issues due to the size of their business. MID-2 argued that the operational implications were felt 50-50% and they continued to engage with their implementation partner to obtain ad hoc technical expertise for support.

b. Modified factors

The only major modification suggested for the Go live stage was by SME implementer, who argued renaming the stage as the "**Sign Off**" stage. It was suggested that the factors identified in go live should only be relevant to recording the lessons learnt and any 'pre' Go live activities should be part of the Sign Off stage.

All steps defined in your Go Live stage are fine but this is a technical Go Live. The actual Go Live happens after all these steps are completed. Therefore you (had) better create another Stage, call it "Pre-Go live" or "Sign off stage". In this stage you should include all these activities and that could comprise 25 activities and once we have the approval to Go Live (as you don't want your technical team to say we are ready to go, rather you would want Business to say or maybe some key or most senior stakeholder to say that I have done my analysis and I am ready to go, so let's go.) then you complete those Go live steps and put the system live. After the Go live stage, we have hyper support that is generally a week or two in which all hands on the deck evaluating what is and what is not working and paying immediate attention to the matter and fix them on the fly (SME implementer).

c. Additional factors

Both large size interviewees LE1 and LE2 expressed a need for post implementation review after the Go Live stage is completed.

A review of the implementation activities should be completed after Go live. All activities before and after Go Live, implementation issues and any issues that took place during Go Live should be recorded and any archives maintained during the project should be included. There were issues in our implementation logged throughout the entire implementation and regularly reviewed and closed as relevant (LE2)

Similarly, SME suggested adding a **new** factor 'Usage of legacy application in parallel and keeping the data in accessible mode for a longer period'. SME shared their implementation experiences by stating that they continue using MYOB alongside with B1 (BusinessOne – SAP ERP application) but that was a convenience decision.

We maintained B1 as the core finance management application and continue using MYOB as a side application (SME)

Likewise, MID-3 suggested considering some **new** technology factors in the Go live stage: 'support staff for post go live and hand over requirements', 'vendor/project team handover to business/operations' and 'post go live internal support for the application'.

You need to establish and complete your support requirement. Remember, once Go live is completed, you need to “hand over” stuff to someone to run post implementation support, as you exit out of the implementation phases (MID-3).

MID-1 also suggested adding **new** factors: 'support program emplace with experienced consultants' and 'training programs for staff (ongoing)' but suggested having training within the people domain.

We believe operational impact and succession planning should be considered after Go live and not within the Go live stage. I think you should have another stage called “post Go live” to record relevant activities. We didn't consider that in our first JD-Edwards implementation but we did after CRM implementation stage one. What we did do was that for stage two, we documented all the processes appropriately so that if someone leaves the project, the knowledge stays within the organisation. (MID-1)

Furthermore, MID-1 commented on post project succession planning and stated:

We couldn't do a proper "success planning" but we did record the functional knowledge by recording business processes and flow charts and did manage the knowledge well. I don't think you will have skill or time to develop all required knowledge during implementation. Therefore; it should be complete after implementation. After the "Go live" stage there should emerge a stage of ongoing support which should cater for these challenges. (MID-1)

d. Removed factors

MID-1 suggested removing the 'effectiveness of inter-organisational system integration' factor to an earlier stage of implementation as in Go live integration is performed and not planned.

7.2.5.3 Section summary

The technology factors identified in the Go live stage were relevant and endorsed by the participants. In addition there were new technology factors recommended for completion. Some new factors were suggested within 'operational implication analysis' factor i: 'post go live internal support for applications' and 'support staff post go live and hand over requirements'.

In addition, there were **new** factors suggested by the participants: 'support program emplace with experienced consultant', 'usage of legacy application in parallel and keeping data in accessible mode for longer period', 'vendor/project team hand over to business/operations and future changes/ enhancements/ left over items or functionality' along with its sub-factor 'prioritisation of items to be completed'.

Considering the relevance of the suggested new technology domain factors within Go live stage, these were accepted and reflected in the revised model. In terms of the suggestion to remove the 'effectiveness of inter-organisational system integration' factor, the researcher decided not to remove this factor as the effectiveness of an integration piece cannot be judged until it is actually delivered. The purpose of listing this factor is to ensure that the midsize businesses tests the effectiveness of integration performed at the Go live stage.

7.2.5.4 Organisational factors

The Organisational factors in the 'Go Live stage' comprised:

- Strategic Management Issues (Update);
- Change strategies (Update);
- Risk Management (Update);
- Effective Communication
- Project monitoring & control
- Organisational change management
- Operational implication analysis
 - ERP business functional impact

Please, see Appendix 7C (12.5) for a detailed reflection on comments received.

a. Agreed factors

While discussing organisational factors, most of the participants recognised their relevance and suggested considering them in the Go live stage. For instance, when case study participants were asked about, 'strategic management issues (update)' both large size participants (MID-2 and MID-3) endorsed this factor's relevance and recommended it to be considered in the Go live stage.

Similarly, when participants were asked about 'change strategies (update)', both large size participants and small midsize participants acknowledged the factor relevance and endorsed it to be considered in go live stage. Likewise, when asked about 'risk management (update)', large size and midsize participants considered it relevant and recommended it to be considered in Go live stage.

In relation to 'effective communication', large size participants, MID-1, MID-3 and SME implementer considered it relevant and recommended to be considered throughout the Go live stage or effective stakeholder engagement, to inform them about progress of Go live activities.

When participants were asked about 'project monitoring & control', all participants from large, small and midsize case study organisations considered it important and recommended it be considered in the model.

Similarly, in relation to 'organisational change management' factor, all small midsize and large enterprise participants agreed to have this factor included in the model and considered it

relevant. SME implementer did not respond to this factor and argued that the Go live stage is about technical delivery and change related matters should be handled before or after go live.

In response to 'operational implication analysis', all small midsize and large size case study participants acknowledged the significance of this factor and recommended it be considered during ERP implementation go live stage. In addition, all participants endorsed the relevance of the sub-factor ERP business functional impact and considered it important. It was even stated by MID-1 that business functional impact should be tested from simple to complex scenarios, testing worst case scenarios for their effective management.

I say yes to both operational impact analysis and ERP business functional impact analysis but after Go live you could see the impacts clearly. I think it was important to have quality standards or calibre required of any great benefit that the business team would take and run with. In our experience, there could have been more preparatory work done on this. I think there should have been more impact analysis on the business side performed. I believe that the analysis work should start the middle way between Build and Construct(ion) phases to understand the system and later deliver in the Construction phase. Once business starts to understand how the system works, they could identify its impacts clearly (LE-1).

According to SME implementer, the operational impact analysis should be conducted earlier;

I think that 'Go live' stage is too late for operational impact analysis. The hand-over strategy to operations should be drafted as part of the Planning stage. In the Planning stage establish a higher level operational handover strategy and how things will happen and before Go live all relevant details should be completed, including how handover to the operational team will happen.

Similarly SME implementer's comments about business functional impact analysis were

I think business functional impact review including, hyper support and other post go live details should be completed here (Go Live stage). The strategy should be, plan early in Planning and execute here (SME implementer)

Both large size interviewees endorsed the relevance of these factors, reporting significant lack of effective management and control during the implementation. Hence, major post implementation issues created problems at the organisational level.

b. Modified factors

SME implementer acknowledged factors identified in the Go Live stage but emphasised **renaming** this stage to be the 'Sign Off stage'. As mentioned earlier, according to SME implementer, the segregation should be within Sign off stage factors and actual Go live stage activities.

c. Additional factors

SME-implementer suggested **new** factors for the proposed Sign Off stage: 'Approval of Go Live' and 'Sign off from business and management'. It was also suggested that the sign off for Go live must be obtained from the most senior stakeholders of the business.

Similarly, MID-3 suggested adding **new** factors: 'future changes/enhancement/left over items implementation' including 'leftover scope items' and also 'Prioritisation of 'to be' completed items'. According to MID-3, these factors are important to include in the Go live stage, as they provide a direction for further enhancement and changes in the application or could contain any leftover functionality or scope items from the project. Appropriately, recording this information would be critical for the business, when they want to address potential issues or perform application enhancements.

I accepted the defined factors in your model, but it is important to note that there will be future on-going changes in the product that will need management, going forward strategy. I think there should be a way to record the leftover items in the Go live stage for the future (MID-3).

SME implementer suggested that within 'operational impact analysis' there should be a **new** factor called 'business expectation assessment' to validate implementation (whether the expectation was achieved?) This factor will enable the organisation to assess and validate the success of implementation and whether the business/stakeholder expectations were met.

I think you should consider having business expectation analysis done in the Go live stage. It must be included and conducted in the end to validate how successfully a project has been delivered. It should be known as "business expectation assessment". This is to validate the implementation and to see whether we have been able to achieve the expectations or not. (SME Implementer)

Furthermore, MID-2 suggested adding a **new** factor: 'writing manuals and sharing information within staff'.

Ongoing training, knowledge management is critical. During our testing processes we drafted manuals and our staff did that as they were learning the new system. They kept recording the steps into their own manuals. The new starts were just given the new manual containing screen shots and text added by staff to [teach] the new people. (MID-2)

d. Removed factors

There were no factors suggested to be removed from the Go live stage.

7.2.5.5 Section summary

The organisational factors identified in the Go live stage are relevant and endorsed by case study participants. In addition, there were some new factors suggested by participants. These factors were: 'writing manuals and sharing the information with staff', 'left over scope items' and 'approvals to go live' factor and its related sub-factors: 'sign off from business representatives and management', 'most senior stakeholders to provide go live sign off (Go or no go decision)' and 'business expectation assessment to validate implementation' (whether the expectation were met?).

The new recommended factors were related to the staff information management, identification of left over scope items for any potential future project or related activities, and finally the approval for Go live. SME implementer stressed a need to rename this stage as Sign off stage to ensure that appropriate sign-off is obtained from business stakeholders. Appreciating the significance of the arguments provided, all new suggested factors were added in the model and, instead of establishing a new Sign off stage, related sign off activities are also included in the pre Go live activities.

7.2.5.6 People factors

People factors in the 'Go Live stage' comprised:

- Staff attitude to change (Update);
- Management attitude (Update);
- End user engagement
- Operational implication analysis

- Succession planning
- Knowledge management for ERP maintenance/support

Please, see Appendix 7C (12.5) for a detailed reflection on comments received.

a. Agreed factors

While discussing the People domain factors, most of the participants identified them relevant and suggested them to be considered in the Go live stage. For instance, when interviewees were asked about the factor 'staff attitude to change (update)', both large size case participants along with small and midsize business representatives acknowledged this factors as relevant and suggested to be considered.

Similarly when participants were asked about 'management attitude (update)', both large size participants and small midsize participants acknowledged experiencing this factor and recommended it to be considered in the Go live stage.

When participants were asked about 'end user engagement', LE2 interpreted this factor to be "the hand-holding of stakeholder" of business users post Go live and considered it important. Similarly, LE1 and other small and midsize representatives also considered this factor to be important, as without appropriate end user engagement it would be difficult to manage change and resistance to change.

In response to 'operational implication analysis', both large size participants considered it important but reported it as their own major implementation weakness. MID-1 and MID-2 also acknowledged the relevance of this factor, but in contrast SME was of the view that at "Go live", only 50% of their operational impact analysis was known. This argument of SME was also seconded by MID-3 who suggested removing this factor from the Go live stage and stated that operational impact analysis should start before Go live. The impact could only be known months after the implementation is completed. According to MID-3, the sub-factors: succession planning and knowledge management for ERP maintenance/ support should also be removed from the Go live stage as these factors should be discussed before Go Live takes place. In contrast, both large size participants (LE1 and LE2), along with other small and midsize representatives such as MID-1 and MID-2 suggested keeping this factor in the Go live stage for verification purposes. LE2 stated that there was not a clear succession planning strategy established for their implementation and it took almost 18 months to have the knowledge effectively transferred to the support team.

As per our experience, I think the operational team thought they had operational impact analysis and succession planning covered but in essence they didn't do it at all. I believe succession planning is a long term process and would take months to finish (LE1).

Similarly, MID-2 provided an insight on their implementation experiences, stating that they purchased a number of hours support with their implementation partner to provide post implementation support whilst maintaining functional knowledge in-house.

b. Modified factors

As indicated earlier, SME-implementer suggested having this stage renamed as 'Sign off' stage and stated that the factors should remain in the stage. It was also suggested to have the Go live stage after "Sign off" is completed, comprising technical details related to Migration to Production (MTP).

c. Additional factors

SME-implementer suggested adding **new** factors in the recommended 'Sign off stage': 'analyse business expectation achievement' and 'operational plan as how to hand over to operations'. It was argued that in the Go live stage, a post go live support structure should be defined including details on how to hand over the application to the operations team. It was also suggested that the discussion about Go Live and post Go live support should start at a higher level from the Planning stage.

Similarly, MID-1 suggested that the staff engagement is critical for new application acceptance and adoption. MID-1 stressed a need to include a new factor training programs for staff (ongoing), so that staff have an opportunity to refresh their knowledge of the application.

The moral of our experience is that whatever the system is and whoever will use; it [person/stakeholder] must be involved early. It should not just be involvement but the key heads of departments and actual doers/users knowing what is coming to them. It is important to get their buy-in at very early stages of implementation. In our experience, when we "went live" and turned off the sales force system and instructed staff to start using the new system, they didn't use it, rather started to use paper instead (MID-1).

MID-2 also suggested adding a **new** factor: 'purchase hours for services with contractor post go live' in the form of a post implementation support agreement. MID-2 recalled their implementation experience of purchase: initially 10 hours for technical and development staff support, and they kept adding more hours as required. Similarly, SME also suggested adding a **new** factor 'training strategies and effectiveness (update)' to identify needs early and engage with trainers. Furthermore, SME argued that in the Go live stage, a person's ability improves with time. It was recommended to consider a **new** factor: 'slow down efficiency of using new applications, increased speed with time'. According to SME,

Succession planning was really important. I put an analogy that if a key person gets hit by the bus on the way home, there has to be someone to cover his work for me (SME)

d. Removed factors

SME implementer recommended removing 'end user engagement' from the Sign off stage:

For people factors, you do not engage with end users during Go live or any attitude doesn't matter. You do perform post implementation review in which you review how you went and record lessons learnt. That would be the time to see whether they love it or hate it and their attitude towards the new system. All this happens only after Go Live is complete and in the post implementation review (SME Implementer).

MID-3 also suggested removing factors defined within operational implication analysis: succession planning and knowledge management for ERP maintenance. This argument was favoured by SME implementer who also suggested firstly renaming the existing Go live stage as Sign off and then having a Go live and Post Go live review stage comprising go live issues discussion.

Some of the factors identified under the people category should be done earlier, such as succession planning or hand over planning etc. The change of roles, responsibilities should be discussed before actual Go live takes place for better adoption and acceptance of the new application (MID-3)

7.2.5.7 Section summary

All of the people factors identified in the Go live stage were endorsed by the case study participants. In addition there were new factors suggested by participants: 'analyse business

expectation achievement, operations handover plan and its sub-factors: how to hand over to operations, post go live structure discussion and strategy definition in planning and implementation.

Furthermore, participants also suggested new people factors: communicate system information to whoever will use and involve and training strategies and effectiveness (update) with related sub-factors: must identify needs early and engage trainer early, training programs for staff (ongoing) and slow efficiency of staff with new application, continuous support.

Considering the relevance of new people factors in the Go live stage, these were added into the model. In relation to the suggestions made for the removal of factors: end user engagement, succession planning and knowledge management for ERP maintenance; it is important to note that the end user engagement and communication would be vital at the last stages of implementation before Go live. Considering SME implementer's suggestion to rename this stage as Sign-off stage, while keeping relevant factors, the sign off process will indeed require key users engagement from business. In addition, succession planning should start early but at the time of project 'Go live' and hand-over. Keeping this factor as a check list item would be beneficial for midsize businesses. Similarly, knowledge management related factors including training had been discussed in the early stages of the model. However, keeping knowledge management as a deliverable item in Go live stage would be beneficial for midsize business management understanding of the process. Therefore, none of these factors were deleted from the model. However, they were repeated in earlier stages.

7.2.6 Summary of Go Live discussion (Sign off)

While discussing the Go live stage and associated factors listed in technology, organisational and people domains, SME implementer argued that the factors listed in Go Live stage actually belong to Sign-off stage. Therefore, SME implementer suggested that the current structure of Go live should be split into two stages. The first should be called Sign-off stage, comprising factors listed in the model, followed by the actual Go live stage that should be used to record lessons learnt. After analysing the suggestion made by SME implementer, it is decided **NOT** to rename Go live stage as Sign off stage, but rather increase the scope of the Go live stage, comprising pre-go live activities, as recommended by SME implementer, including obtain sign-off from business, complete go live drills, start the go live processes and so forth. The later

activities of recording lessons learnt and reviewing the practical go live activities completed should wrap up the discussion.

Based on case study feedback on Go live stage factors, it can be concluded that the predefined factors were endorsed and suggestion were made to add other factors based on participant's practical experience with go live. For technology domain factors, it was suggested to establish post go live support along with identification of technical staff to support, enabling the legacy system to continue operating for a longer period, introduction of technical support programs with assistance from an experienced partner, changes or enhancements in the application and recording of items not completed in the project. In addition, operational hand-over was also identified as a major deliverable after Go live is completed. Similarly in organisational and people domains, it was suggested to obtain stakeholder approval before Go live activities would commence. The approval or sign-off could be from a management representative or from range of different stakeholders. Also, business expectations should be verified with the implementation outcomes. The training material such as written manuals and project documentation should be shared with support staff. It was also suggested to have an operational handover plan developed, encapsulating the go live and post go live structure details and support mechanisms. Training strategies and effective delivery of training programs should also be considered for the benefit of end users. Finally, an effective communication and coordination would be critical for the success of the project. Table 7.6 presents the revised factors in the Go live stage as a result of case study interviews analysis.

Table 7.6: Go live stage factors after Case study discussion

Domain	Go Live stage (Before Case study)	(New Factors or changes as recommended)	Go Live stage (After Case study)
Technology factors	<ul style="list-style-type: none"> • ERP implementation issues (Update); • Business & Technology Issues (Update); • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ Knowledge management for ERP maintenance/support ❖ Effectiveness of inter-organisational system integration 	<ul style="list-style-type: none"> • Support Program in-place with experienced consultant • Training programs for staff (ongoing) • Usage of legacy application in parallel and keeping data in accessible mode for longer period • Support Staff Post Go Live and Hand Over requirements • Vendor/Project Team hand over to business/operations • Post Go Live internal support for applications <p>(Issues post go live – the figures not balances when went live. Urgent assistance to fix the glitch, Payroll – Good, Payment receivable – Fine)</p>	<ul style="list-style-type: none"> • ERP implementation (Go live) issues (Update); • Business & Technology Issues (Update); - adoption • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ Knowledge management for ERP maintenance/support ❖ Effectiveness of inter-organisational system integration ❖ Post Go Live internal support for applications ❖ Support Staff Post Go Live and Hand Over requirements • Support Program emplace with experienced consultant • Usage of legacy application in parallel and keeping data in accessible mode for longer period • Future changes/enhancements/left over items or functionality <ul style="list-style-type: none"> ○ Prioritisation of items to be completed. • Vendor/Project Team hand over to business/operations
Organisational factors	<ul style="list-style-type: none"> • Strategic Management Issues (Update); • Change strategies (Update); • Risk Management (Update); • Effective Communication • Project monitoring & control • Organisational change management • <u>Operational implication analysis</u> <ul style="list-style-type: none"> • ERP business functional impact 	<ul style="list-style-type: none"> • Approval to Go Live • Sign off from Business & Management – Most senior stakeholders to provide Go Live sign off (take a decision) • Business Expectation Assessment to validate implementation (whether the expectation was achieved?) • Testing, writing manual and sharing info with staff • Future changes/enhancements/left over items <ul style="list-style-type: none"> ○ Left over scope items • Prioritisation of to be completed items 	<ul style="list-style-type: none"> • Strategic Management Issues (Update); • Change strategies (Update); • Risk Management (Update); • Effective Communication • Project monitoring & control • Organisational change management • <u>Operational implication analysis</u> <ul style="list-style-type: none"> • ERP business functional impact (Simple to complex, far exceed worst case scenarios) • Approvals to Go Live <ul style="list-style-type: none"> ○ Sign off from Business representatives and Management– ○ Most senior stakeholders to provide Go Live sign off (Go or no go decision) ○ Business Expectation Assessment to validate implementation • Testing, writing manuals and sharing the information with staff <ul style="list-style-type: none"> ○ Left over scope items
People factors	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • End user engagement • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ❖ Succession planning ❖ Knowledge management for ERP maintenance/support 	<ul style="list-style-type: none"> • Analyst business expectation achievement • Operations plan how to hand over to operations ,– post go live structure discussion – Strategy define in Planning phase • Training strategies and effectiveness (Update) (must identify needs early and engage trainer early) • Slow down efficiency of using new app, increased speed with time 	<ul style="list-style-type: none"> • Staff attitude to change (Update); • Management attitude (Update); • End user engagement (too late for engagement, Obtain sign off and communicate go live) • <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ Succession planning ○ Knowledge management for ERP maintenance/support • Analyse business expectation achievement • <u>Operations handover plan</u> <ul style="list-style-type: none"> ○ how to hand over to operations ,– ○ post go live structure discussion – ○ Strategy definition in Planning and implemented now • <u>Training strategies and effectiveness (Update)</u> <ul style="list-style-type: none"> ○ Must identify needs early and engage trainer early ○ Training programs for staff (ongoing) ○ Slow efficiency of staff with new application, continuous support • Communicate- system information to whoever will use and involve

7.3 Revised ERP implementation model

In this section, a revised ERP implementation model is presented, reflective of changes suggested in the case study analysis. Based on the case study findings, it is concluded that most of the factors were endorsed as identified in the earlier stage of data collection (expert panel). These were few exceptions though, relating to the understanding of factors and their actual occurrences in a participant's implementation experience. For instance, all case study participants argued to relocate 'data migration' and 'application integration' relating factors to the earlier stage(s) of the model. It was further stated that the Construction/ Delivery stage should only be considered for the practical work delivery and completion; therefore, factors relating to planning or strategizing should only be considered in the pre-planning or planning stage(s).

In relation to the differences of opinions amongst large and midsize businesses; it is concluded that most experiences were the same; whilst the difference remain to be in terms of the size and duration of an outcome. Furthermore, it was noted that small and midsize business participants were slightly unsure to differentiate amongst pre-planning and planning stages and found it difficult to suggest factors in a desired order. Similarly, SME implementer argued that their engagement in an ERP project generally starts in the "Detailed design stage". It was further stated that they (implementers) expect midsize businesses to know their responsibilities towards pre-requisite tasks including; identification of key business requirements, data sources, data cleansing and verification requirements along with the identification of key staff for the implementation.

Below is a summary of the factors identified at the end of case study analysis;

7.2.1 Pre-Planning stage

Based on literature and data collection analysis, the consolidated list of factors related to pre-planning stage include: business and technical requirements; for the identification of organisational functional knowledge and gathering technical requirements along with identification of related issues, business process change impact analysis on staff, applications understanding and accurate information on ERP; to assess the suitability of available solutions for business alignment, impact of technology; to understand the broader technology impact on the business, identify value stream for organisation; to map the existing business process correctly as part of requirement gathering exercise, selection criteria with relevant parameters;

to ensure core business requirements are appropriately translated for suitable application selection, business process efficiency and improvement analysis, prepare for data migration and analyse application integration requirements; to outline data migration and application integration requirements with ERP implementation. Furthermore, before project initiation some factors are considered important including: development of strong business case, gaining support from stakeholders and senior management, project resource analysis including budget for financial viability, return on investment analysis, in-house staff skill assessment analysis, performing project risks and issues analysis, establishing project communication, resource management and conflict resolution strategies, understanding the cross business functions; such as inter-departmental shared functionality and aligning project objectives with the business strategy are some of the key factors that midsize business should consider before ERP project inception. These are factors associated to pre-planning stage, considered important of midsize business implementation.

7.2.2 Planning stage

Further to the pre-planning stage, based on literature analysis and two data collection results, it is concluded that the midsize business leaders should consider factors such as: factors related to ERP package selection, minimal reliance on sales advice rather performing independent ERP package validation and ensuring ERP package has local user support base available. Similarly, factors relating to new technology adoption, establishment of infrastructure strategy and ERP application architecture understanding enabling businesses to have controlled implementation based on industry standards. Similarly, it was noted that the application integration requirements and compatibility issues with other applications considered important while drafting integration strategy in the planning stage. Furthermore, establishing data migration strategy, data validation, verification and cleansing are some of the key conversation factors needing attention in the planning stage. Internal organisational staff experience and expertise along with cultural values, resource limitation including budget, time and skill of staff, providing incentives with deliverables, conflict resolution strategies formulation, and post go live structure consideration along with commitment from department to share staff for training and UAT. Testing related factors were also considered important especially an early planning for testing including: plan for testing and develop test strategy, business resources identification for UAT were some factors related to planning stage. Furthermore, stakeholder engagement and expectation analysis, communication strategy development execution, change management plan development and effective knowledge management are also considered important factors of the planning stage. Finally, Project

management factors (plan, leadership, objectives, change, risk & issues, communication, resources (budget), time management and establishment of stage gates) along with government regulatory changes, management commitment, collective benefits, cross organisational business functions, organisational value stream and strategic management issues were identified as relevant for planning stage.

7.2.3 Detail Design stage (Set-up, Re-engineer, Design)

In relation to the Detail design stage, there were factors identified in the sub-stages categories including set-up, re-engineer, system design stages. Based on literature review and two data collection stage analysis, while implementation ERP application by midsize business, in the detail design stage, they should consider: technical delivery factors including development of a technical and infrastructure strategy; design and execution, planning for the data migration and design along with application integration designing aspect of the system. Furthermore, functional and system design factors including: development of use case maps for system design, cross dimensional functions, product demonstration in design and establishment of a customisations list and system design strategy. It was also argued that the managerial style is important for ERP implementation along with situational leadership and also any merger and/or acquisition issues impact the scope of the project. Similarly, application testing related factors including testing strategy development and execution, organising dedicated resources for testing, an ability of the project team to fix defects identified in testing and planning/effective management of UAT process. Factors related to change management and the management of staff attitude to change along with revising end user expectations. In addition, training related factors to enhance in-house expertise/ skill and capacity and acknowledging of the resources limitations (skill), engagement of external contractors, identification of staff for temporary backfill, management of the project team and engagement with internal/external. Furthermore, for enhancement of staff skill set, skill match assessment for knowledge transfer, illustration of training strategy and training plans, team building and competency testing are some of the factor identified. Finally, project management related factors including: cost of technology, cost of implementation, monitoring and control, stakeholder expectations management, clarity in communication and coordination, change management, resource management, organisational structure and ideology, managerial style, scope management, detail design development, establishing governing principles for project and business process change have identified as important.

7.2.4 Delivery stage (Configure & Test)

Based on literature and data collection analysis, the delivery stage comprising of configuration, development and testing activities and in this stage the work actually gets completed. It is noted from the study that in this stage, data migration related factors would be realised and work practically gets completed including repeat data conversion (DC) cycles, improve data quality, cleansing and so forth. Furthermore, Interface/integrate with external applications gets completed along with integration effectiveness testing. Technical delivery related factors such as: complexity of ERP, quality assurance and management and SDLC management are also identified as important. The Functional design factors such as: cross dimensional factors impact would enable to test the impact of ERP on inter-departmental functions along with business and technology impact analysis would be apparent. Staff training related factors to enhance in-house expertise, stakeholder management by actively engaging with end user is important and practically performing change on staff operations. In this stage, application is tested thoroughly and related factors include: system testing, UAT, operational impact analysis (transition and succession planning), UAT validation and testing with the live data and prototyping. Finally, Project management related factors including: communication coordination, project monitoring and control, cost control and tracking, impact of any scope change on the project, acknowledgement of resources constraints (skill), internal and external communication and issues relating to merger and acquisitions with midsize businesses should be considered.

7.2.5 Go Live stage (Sign off)

Finally, the last stage in the ERP implementation is known as “Go live”. In this stage, the newly business specific designed, configured, developed and tested application to be put to live after data migration and application integration processes are completed. Factors associated to go live stage include: business technology issues, operational impact analysis to understand the business and technology change management requirements, post go live support, a policy on usage of legacy system after go live for a certain period, knowledge transfer related factors including succession planning, transition and operational handover are considered important. Furthermore, organisational change management factors including: strategic management, change implication issues and management, staff and management attitude to change, end user management, end user training and analysing business expectation are considered important. Finally, Project management related factors including: risk management, communication, project management, monitoring control, operational impact analysis –

business functional change and Go live approval or sign off obtained and effectively communicated to the stakeholders is important.

Table 7.7 below presents the revised ERP implementation model for midsize businesses as a result of case study interviews data collection analysis.

Table 7.7: Refined ERP implementation model after Case Study findings

Stages	Technology factors	Organisational factors	People factors
<p>Pre-Planning stage</p>	<ul style="list-style-type: none"> • <u>Business requirements identification</u> <ul style="list-style-type: none"> ◦ Technical requirements analysis • Technical requirements identification • Business & Technology Issues; • Application understanding & usefulness • Impact of technology • Accurate information on ERP applications • Identify value stream for organisation • Selection criteria with relevant parameters • <u>Prepare for Data migration</u> <ul style="list-style-type: none"> ◦ Early development of strategy ◦ Strategy Communication • Existing state to new application analysis (legacy to new change) • Integration requirements 	<ul style="list-style-type: none"> • <u>Organisational Knowledge</u> <ul style="list-style-type: none"> ◦ Business functional knowledge • Develop Strong business case • Cross organisational business functions • Organisational Political support • Change and Risk Analysis; • Stakeholder engagement plan • Effective Communication strategy (who what when how) • Effective technique for communication such as survey • Executive Management Commitment • Budget Estimates (tentative dollar figures) • Business Objective and direction -> Business strategy 	<ul style="list-style-type: none"> • Communication Strategies • Business demonstration – resource size and skills • <u>Resource Management Plan</u> <ul style="list-style-type: none"> ◦ Resource backfill planning by business ◦ Project resource size planning (type nature skill) ◦ Identify limited resources (skills) ◦ What ERP will do to people • Business case foundations ,people impact • Efficiency brought by ERP to people • Return on investment (ROI) • Processes improvement • Conflict existence
<p>Planning stage</p>	<ul style="list-style-type: none"> • Selection criteria with relevant parameters • Less reliance on sales advice • New technology adoption issues (mobility, high availability, complexity, network etc.) • Industry standards • Proposed application System architecture analysis • Technical staff/consultant expertise • Technical requirements identification and analysis • <u>Plan for Testing</u> <ul style="list-style-type: none"> ◦ Decide on Testing Tools– QC (QA, QM protocols) • Engage with technical stakeholders • Identify Applications for Integration • Compatibility issues with other applications • Establish infrastructure strategy – Technology requirements • <u>Establish Application Integration strategy</u> <ul style="list-style-type: none"> • Identify systems for integration • <u>Establish Data Migration strategy</u> <ul style="list-style-type: none"> • Strategy communication • Data validation, verification and cleansing • Time & Cost of implementation (software cost - end of this stage these were known) 	<ul style="list-style-type: none"> • Cultural factors (local, national) • Government or regularity change • External environmental factors • <u>Project Management;</u> <ul style="list-style-type: none"> ◦ Detailed project plan & communication strategy ◦ Project Leadership (risk & issues) ◦ Clear & well defined objectives (Scope) ◦ Organisational change management ◦ Risk Planning & Monitoring; ◦ Effective Communication strategy, based on “who, what, when and how” ◦ Effectiveness techniques for communication (survey) ◦ Limited Resources (Budget) • Executive Management Commitment • Business impact analysis, • Definition of individual and collective benefits • Cross organisational business functions • Plan Time & Cost of implementation <ul style="list-style-type: none"> ◦ Clear idea on Cost of implementation at end of planning Stage • Identify value stream for organisation • Change and Risk Analysis • Stakeholder expectation Analysis • Strategic Management Issues • External Organisational factors • Macro environmental factors 	<ul style="list-style-type: none"> • Analysis of User support base for application • Limited resources (people/skill) • Effective time management • Change Management planning • Clarity in Communication • <u>Team management & control</u> <ul style="list-style-type: none"> ◦ Team Building ◦ Outline Team Competence matrix ◦ Develop Training strategies • Incentives with deliverables. • Conflict resolution procedures • Plan for testing and identify staffing requirement • Develop Testing Strategy, Test plan, test scenarios and test cases record in QC • Realistic ‘end user’ expectation analysis (Minimal or no customisations) • Limited resources (Skills) • Resource utilisation details • Develop Communication Strategies • Develop conflict resolution procedures • Develop Knowledge management strategy • Allocation of staff on project for Knowledge Transfer • Internal and external team engagement planning • Develop Testing Strategy • Identify key business user - testing resources • Identify key business staff for UAT

Stages	Technology factors	Organisational factors	People factors
		<ul style="list-style-type: none"> Establish project Governing Principles as part of Charter (no/less customizations) 	<ul style="list-style-type: none"> Define Post Go Live support structure (high level strategy) Commitment from department resources (business) Resources engagement (technical, functional) Package Selection design and Contract signing Establish Stage Gates – Baseline and deliverables
<p>Detail Design stage (Set-up, Re-engineer, System Design)</p>	<ul style="list-style-type: none"> ERP complexity; In house expertise; <ul style="list-style-type: none"> Identify training requirements (people factor) Cost of implementation ERP integration issues with other applications Development of a system design strategy Business & Technology Issues <u>Technical and infrastructure Strategy</u> <ul style="list-style-type: none"> Technical Lock Down Vendor selection -> finalise technical requirements -> sizing -> procure hardware/ servers and other technology <u>Data migration</u> <ul style="list-style-type: none"> Data quality analysis & data cleansing Data migration – revision/update Data structures establishment for migration Establish requirements and sampling <u>Application integration</u> <ul style="list-style-type: none"> Integration points – systems for integration <u>Establishing Testing strategy</u> <ul style="list-style-type: none"> Setup test processes, script creation recording Cost of Technology Build use case maps for design Show product in design Customisation and development required Information system function 	<ul style="list-style-type: none"> <u>Cost of implementation</u> <ul style="list-style-type: none"> Limited Resources (Budget) Situational Leadership issues Issues due to Mergers/ Acquisitions Cross dimensional factor impact <u>Project Management:</u> <ul style="list-style-type: none"> Project monitoring & control Risk Monitoring; Stakeholder expectation management Effective Communication & Coordination; Organisational change management Organizational resources management Organisational structure definition Organisational Ideology; Effects of managerial style Stakeholder expectation analysis Effective communication and coordination Organisational change management Scope management Detail Design: functional details, processes, fit gap – business process functionality Expand on Strategy for <u>Governing Principles</u> Business process change or customisations 	<ul style="list-style-type: none"> <u>Limited Resources (People/Skill)</u> <ul style="list-style-type: none"> Trained business staff Professional external consultants Temporary staff to backfill existing business staff In-house expertise Team management & control <u>Change Management</u> <ul style="list-style-type: none"> Business support for UAT team Staff attitude to change Management attitude Organisational Staff engagement Clarity in communication Communication transparency Internal & external team engagement Skill match assessment for knowledge transfer Establish training strategy & build training plans Team Building activities Team Competence Effects of managerial style (important +ve or -ve) Dedicated resources for testing (people/skill) An ability to fix defects in testing Training strategies (revision) Define UAT management strategy (in Test strategy) Plan for User Acceptance Testing (UAT) Revise “end user” expectation analysis
<p>Delivery stage (Configure, develop and test)</p>	<ul style="list-style-type: none"> <u>Data migration –(Practically performing)</u> <ul style="list-style-type: none"> Data quality analysis & data cleansing Repetitive data cleansing cycles Improve data quality and data structures Prepare live data for testing Data manipulation & data ready for import Data migration & Validation Early start: Migration trial and cleansing process to get data ready for system <u>Application integration</u> <ul style="list-style-type: none"> Interface system information Integrate and test integration 	<ul style="list-style-type: none"> Limited Resources (Budget) Issues due to Mergers/ Acquisitions (Impact of scope change on project) Cross dimensional factor impact Information System Function (User acceptance testing validation) Effective Communication & Coordination Project monitoring & control (Reporting) Organisational change management (Monitoring) Cost tracking and updates Impact of scope change on project 	<ul style="list-style-type: none"> <u>Limited Resources (Skill):</u> <ul style="list-style-type: none"> Business staff training (functional and for UAT) Staff Involvement; End user engagement In-house expertise; (gradually improvement) Communication transparency Internal & external team engagement <u>System Testing</u> <ul style="list-style-type: none"> Resource plan for testing (PEOPLE) Setup defect management triage process Allocate dedicated resources for testing (people/skill)

Stages	Technology factors	Organisational factors	People factors
	<ul style="list-style-type: none"> ○ Perform Application integrations ○ Perform System integration ○ Integration Testing ○ Effectiveness of inter-organisational system integration ● Business & Technology Issues (full impact) ● ERP complexity ● Quality Assurance and Quality Management <ul style="list-style-type: none"> ○ Work flow management, Testing, bug fixing, Tracking, QC ● Ongoing SDLC process management ● System Testing <ul style="list-style-type: none"> ○ Prototyping for testing ● Testing with live data 		<p>(An ability to fix defects in testing)</p> <ul style="list-style-type: none"> ○ Key users involvement for testing ● <u>Perform Change Management (on people)</u> <ul style="list-style-type: none"> ○ Business support for UAT team (on going) ○ Impact of Change on staff ● User support base for application (done later) ● <u>Perform User Acceptance Testing</u> <ul style="list-style-type: none"> ○ Identify staff for UAT and training ○ Perform UAT from identified staff ○ UAT management ● Internal & external communication (supplier/ partners) ● <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ Succession planning ○ Knowledge transfer strategy ○ Knowledge management for ERP maintenance/support
<p>Go Live stage (Sign off and Go live)</p>	<ul style="list-style-type: none"> ● ERP implementation (Go live) issues (Update); ● Business & Technology Issues (Update); - adoption ● <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ Knowledge management for ERP maintenance/support ○ Effectiveness of inter-organisational system integration ○ Post Go Live internal support for applications ○ Support Staff Post Go Live and Hand Over requirements ● Support Program emplace with experienced consultant ● Usage of legacy application in parallel and keeping data in accessible mode for longer period ● Future changes/enhancements/left over items or functionality <ul style="list-style-type: none"> ○ Prioritisation of items to be completed. ● Vendor/Project Team hand over to business/operations 	<ul style="list-style-type: none"> ● Strategic Management Issues (Update); ● Change strategies (Update); ● Risk Management (Update); ● Effective Communication ● Project monitoring & control ● Organisational change management ● <u>Operational implication analysis</u> <ul style="list-style-type: none"> ● ERP business functional impact (Simple to complex, far exceed worst case scenarios) ● Approvals to Go Live <ul style="list-style-type: none"> ○ Sign off from Business representatives and Management– ○ Most senior stakeholders to provide Go Live sign off (Go or no go decision) ○ Business Expectation Assessment to validate implementation ● Testing, writing manuals and sharing the information with staff <ul style="list-style-type: none"> ○ Left over scope items 	<ul style="list-style-type: none"> ● Staff attitude to change (Update); ● Management attitude (Update); ● End user engagement (<i>too late for engagement, Obtain sign off and communicate go live</i>) ● <u>Operational implication analysis</u> <ul style="list-style-type: none"> ○ Succession planning ○ Knowledge management for ERP maintenance/support ● Analyse business expectation achievement ● <u>Operations handover plan</u> <ul style="list-style-type: none"> ○ how to hand over to operations ,– ○ post go live structure discussion – ○ Strategy definition in Planning and implemented now ● <u>Training strategies and effectiveness (Update)</u> <ul style="list-style-type: none"> ○ Must identify needs early and engage trainer early ○ Training programs for staff (ongoing) ○ Slow efficiency of staff with new application, continuous support ● Communicate system information to stakeholders

Chapter Eight

Conclusion

8.1 Introduction

In this final chapter of the thesis, the purposes of the study and the research questions will be discussed. Subsequently, the theoretical and practical contribution of this study in the form of the ERP implementation model for midsize businesses will also be discussed. The generalisability of the research will be examined, as it is an instrument to investigate the adoption of ERP by midsize businesses. Finally, research limitations and the future research potential in this field will be discussed

8.2 Research questions

This study was aimed to address the research questions, as outlined in Chapter four (refer Section: 4.2):

8.2.1 Question one

What are the factors that influence ERP adoption in midsize businesses?

ERP applications combine business functions and integrate with different departments, presenting a uniform, integrated presentation (Koch, 2003). To achieve an integrated view and an interactive business model with customers, supplier and business peers, midsize businesses adopt ERP applications (Alshawi et al., 2011). Based on the literature analysis, the adoption of ERP systems by midsize businesses tend to be influenced by several different factors. According to Kennerley et al. (2001) these factors include: a need for business efficiency, process improvement and control, inventory management, capacity optimisation, increase leverage on suppliers and an improved ability to plan. Similarly, Klaus et al. (2000) argued that the midsize businesses' desire to have cost effectiveness and collaborative working relationships with larger enterprises could influence them to adopt ERP applications. Rao (2000) argued that continuous industrialisation and midsize business's desire for the new technologies and the availability of midsize business centric ERP applications could play vital role to influence their decision. Furthermore, source ERP products in comparison to vendor branded ERP systems are comparatively cheap to purchase, implement and maintain. The low cost dependencies and business complexity standardisation requirements could influence midsize business decision to adopt ERP (Haddara & Zach, 2011).

Some of the organisational factors with potential influence on midsize business to adopt ERP applications include: business complexity, change management, external factors (supply chain partners) and peer to peer networking pressures could be considered important. Furthermore, cost drivers, business functional requirements, flexibility, scalability and the degree that ERP can align itself to existing businesses process could be some of the other influential factors for the selection of ERP applications (Haddara and Zach, 2011).

Haddara and Zach (2011) further argued that the midsize businesses are generally influenced by internal organisational and technological factors instead of the industry or market-related factors. It is also noted that in some cases, due to the higher rate of collaboration amongst midsize organisations, businesses are likely to adopt ERP due to environmental factors. In addition, businesses' desire to compete in the market, survival and to retain customers could be a few of the drivers influencing ERP adoption. Furthermore, willingness of midsize businesses and their readiness for ERP adoption could be affected by their type of industry, such as manufacturing, retail, customer services and so forth (Haddara & Zach, 2011).

It was further argued by researchers (Barad et al., 2001; Rao, 2000; Gable, 1999; Rovere et al., 1996) that the lack of experience in adopting ERP, access to an appropriate information for decision making and scarcity of resources (i.e. skill, time and money) makes it harder for midsize business to decide on ERP with confidence. Furthermore, selection of an effective IT solution; cost of implementation and customisations addition cost, staff training requirements and staff commitment along with post implementation support issues are some of the factors that should be considered by midsize businesses while adopting ERP.

A number of new factors emerged or were modified during both phases of the data collection in this thesis. These were: change strategies development and change management, project management related factors identification and their execution in multiple stages of implementation, risk management, resource management including identification of internal and external contractor resources and allocation of roles and responsibilities, end user management for training and user acceptance testing, impact of limited resources and their effective management on project including time, budget and skills. Similarly, factors associated to ERP complexity including data conversion requirements, application integration, development and customisations management, testing strategy development execution of multi-layers of testing for quality assurance and so forth. Finally, factors associated to a broader impact including staff attitude to change, organisational ideology, effects of merger or

acquisition on a project, strategic management issues, leadership support for the project and managerial style were identified from literature analysis and improved in the study.

8.2.2 Question two

What are the stages of ERP adoption that are relevant to midsize businesses?

From the literature, a series of process models for ERP implementation were identified. These models each comprised a number of different adoption stages. According to Esteves and Pastor, (1999), the ERP adoption is a transitional process starting from one functional state to another and consists of six stages: Adoption and decision-making, Acquisition, Implementation, Use and maintenance, Evolution and Retirement. Similarly, other researchers presented stages with different names and execution patterns such as” Adoption decision, Acquisition/Chartering/Planning, Focus/Design/Setup, 'As is'/reengineering, 'to be'/design, construction/configuration and testing and finally Go live/installation/implementation (Bancroft, 1998; Ross 1998; Esteves 1998; Markus and Tanis 2000; Parr et al., 2000). Some researchers also emphasised post implementation stages, comprising post go live activities including: shakedown, stabilisation, enhancement, transformation/evolution and retirements stage (Ross 1998; Esteves 1998; Markus and Tanis 2000; Parr et al., 2000).

Parr et al (2000) used a collaborative approach by including previous methodologies to develop a Project Phased model (PPM) for small and midsize business. Based on the literature analysis and using Parr et al's (2000) model as baseline; the researcher developed an ERP adoption model for midsize businesses comprising six stages: Pre-planning, Planning, Setup and Reengineer, System design, Configuration and testing, Installation and 'Go live'. At the end of first data collection stage (expert panel), the stages identified from literature were revised by consolidating some of the stages. The revised stages were Pre-planning, Planning, Build stage (setup, reengineer, system design), Construction stage (configuration, other activities and testing), Go live stage. As a result of the second data collection stage (case study interviews), the names of some stages were modified for potential midsize business manager/owner's convenience.

The final revised stages were: Pre-planning, Planning, Detail design stage (setup, reengineer and system design), Delivery stage (configuration, other activities and testing) and Go live stage (sign off sub-stage).

8.2.3 Question three

In what stages of ERP implementation are these factors relevant?

The factors identified from literature were categorised into three domains: organisational, technology and people domains. Factors identified were revised based on the data collection. Consequently, a revised ERP implementation model was developed comprising factors associated with midsize businesses. Table 8.1 provides a summary of the role that the midsize factors play across the various relevant ERP implementation stages.

Table 8.1: Summary of factors relevant to ERP in midsize

Stages	Technology factors	Organisational factors	People factors
Pre-Planning stage	Technology factors in the pre-planning stage are designed to shortlist the preliminary technical details to help midsize business prepare for the ERP implementation. Significance of business and technical requirements, the impact of technology, setting up selection criteria, analysis of legacy system, integration and Data migration requirements are some of the factors considered important.	The Organisational factors in the pre-planning stage are designed to outline significance of recording organisational and business functional knowledge. In addition, to help midsize business leaders consider developing a business case, gaining political support, workout budgetary requirements, strategizing stakeholder management, define ways to communicate and establishment of a collective business strategy for ERP implementation are important.	People factors in the pre-planning stage are designed to help midsize businesses identify their resources and communication needs for the implementation. This includes, a realistic analysis of internal resource base, prepare for staff back-fill by allocating key resources to the project, identifying impact on people due to ERP, return on investment, a view on managing business process improvement and conflict resolution process.
Planning stage	Technology factors in the planning stage are designed to highlight the technical requirements for ERP implementation. Selection of a suitable product has been identified as important, hence related factors: selection criteria development reflecting requirements and internal suitability test rather relying on sales advice. Similarly, new technology adoption requirements, planning for technical tools, technical stakeholders engagement, identify applications for integration, establishing data migration and infrastructure strategies are all important.	Organisational factors in the planning stage are designed to help midsize business leaders plan for ERP implementation. Key factors were project management and planned related along with factors having external impact on implementation including, government or regularity changes, cultural effects. Furthermore, internal factors such as management support and commitment, defining ERP benefits to the organisation for potential change, risk and strategic management are important.	People factors in the planning stage are designed to help midsize business manage and prepare for ERP implementation by streamlining people requirements. Primarily, team and resource management along with other factors including: communication and coordination, team building, training, conflict resolution, and providing incentives with deliverables are important. Furthermore, factors with broader impact including: managing change in people, resource utilisation and managing time, internal and external resources, knowledge transfer requirements, preparing for testing and UAT and managing end user expectations.
Detail Design stage (Set-up, Re-engineer, System Design)	Technology factors in the Detail Design stage are to help articulate technical and business functional design details for the implementation. This including: developing use case maps for design, designing the system, understanding ERP complexities, in-house expertise analysis, application integration issues, technical infrastructure	Organisational factors in the Detail Design stage define the impact of implementation at an organisational level. Identified factors include: project management related factors, scope management and resource management. Similarly defining governing principles to manage and control customisations, organisational change and ideology, defining organisational structure to	People factors in the Detail Design stage help identify key resource/people requirements for management. This includes: team management and control, management of change with business, communication coordination, plan for staff training, identify resources for testing including UAT, ability to fix defects and reliance on external

Stages	Technology factors	Organisational factors	People factors
	enablement and technical work management, data conversion and migration management and so forth.	assist business process change, effects of managerial style, stakeholder and leadership support.	contractors and management of end user expectations.
Delivery stage (Configure, develop and test)	Technology factors in the Delivery stage are designed to assist midsize business understand the execution details and associated critical factors. This includes: execution of data conversion, data quality analysis, and cleansing and migration. Furthermore factors related to application integration and potential issues management, a need for quality assurance process, SDLC management and testing the system.	Organisational factors in the Delivery stage are designed to outline key factors with the organisational impact including: impact of resource limitation (budget), impact of mergers/ acquisition on project scope and delivery, user acceptance and validation of new system and impact of change at an organisational level, project governance and effective scope management.	People factors in the Delivery stage are designed to assist midsize businesses respond to resource/people requirements including: skills shortage, staff engagement during implementation, stakeholder management, and gradual knowledge transfer with improvements in internal skills. Training of end users, system testing and User acceptance testing along with communication and coordination have also identified as important factors.
Go Live stage (Sign off and Go live)	Technology factors in the Go live stage are designed to assist midsize managers understand technical requirements for go live process. This includes: ensuring technical knowledge is retained, internal systems are integrated, technical issues are resolved, a team structure to support post go live is established, a decision on access to legacy system after go live and operational handover process from project to operations team.	Organisational factors in the Go live stage are designed to help identify organisational responsibilities at the go live including: lessons learnt (strategic, change, risk, project delivery management experiences). In addition, before go live starts, a process to obtain sign off from business leadership to get system live. Drafting manual and project material for handover as deliverable along with left over functionality that need to be developed are important.	People factors in the Go live stage are designed to enable midsize leadership respond to people issues. The factors identified include: managing change effects on people, staff attitude to change, end user resistance to use new system, operational impact, succession planning and knowledge transfer completed, matching the end user expectations with final delivery, operational handover and the effectiveness of training provided as lesson learnt.

8.3 Theoretical contribution

The research in ERP implementation spectrum has been about adoption factors or implementation processes, however in this research, an attempt was made to combine both streams of research in an innovative manner. This study contributes to ERP implementation and adoption theory, specifically in relation to midsize businesses. The model for ERP implementation in midsize business is the core theoretical contribution. The model was designed utilising existing literature to identify critical factors for ERP adoption, along with process models for ERP implementation presented by other researchers. The final model presented in this study encapsulates the implementation factors across technology, organisational and people domains, whilst analysing their relevance based on different implementation stages. The model was tested and refined utilising qualitative data collection techniques.

It was observed from the study that attention may be needed to support midsize business by providing context details that could be useful for their ERP adoption perspective. As discussed in Chapter Three, previous models had emphasised ERP adoption and implementation in large size businesses. However, due to technology enhancement, large size market saturation and competition in the midsize business arena; midsize businesses are finding sophisticated business management applications to be an attractive alternate. Due to midsize business unique characteristics as well as operational limitations, midsize businesses are considered vulnerable to the adoption of such systems. Hence, a model presentation containing implementation process details along with associated factors to implementation would enable them to implement and adopt ERP satisfactorily. Although, the model presented in this study was tested with Australian businesses; it should be useful for midsize businesses in a wider context.

8.4 Practical contribution

Even though the model for ERP implementation was designed based on literature analysis, it was tested with the practical experiences of ERP professionals and academics that specialised in the midsize business arena. The two dynamic qualitative data collection processes enabled the researcher to test and refine the model, to ensure that the model is realistic and practically usable by midsize business managers.

The research questions investigated in this study attempted to explore factors influencing midsize businesses to adopt ERP systems. This enabled researcher to reason why midsize businesses would be interested in the ERP applications despite their resource limitation (lack of money, skill and time). Additionally, it was practical to understand the relevant stages for ERP implementation in relation to midsize business. Major ERP implementation stages were identified from the literature. However, during the data collection phases these stages were reviewed and altered to align the model findings with the requirements of midsize businesses. Finally, it was important to understand the factors relating to ERP implementation and their sequence of occurrence in a specific stage of implementation. In the second data collection stage (Case study analysis), it was noted that the case study participants provided feedback based on their practical experience. Such feedback brought another level of practical relevance to the model, enabling the researcher to alter the model accordingly.

The researcher is satisfied that the final iteration of the model would be useful for midsize business managers, who are not anticipated to have detailed expertise in the area. The ERP

implementation model would assist them as a check list or quality assurance tool, to remain in control of the entire implementation activities.

It was noted from the study that midsize business owners and management lack knowledge and resources required for the ERP adoption, so this model presents an opportunity for them to benefit from following a structured approach to ERP implementation. The midsize business manager/decision maker will be benefited by:

- Having better understanding of the pre-requisite factors and content before initiating an ERP project. Furthermore, it will provide an understanding of the activities while planning, executing and understanding of the factors associated to the technical, organisational and people domains of the ERP implementation.
- This research will benefit midsize business managers and owners to use the model findings as a checklist before and after completion of every stage of implementation and question the delivery standards accomplished by the vendor or an implementation partner.
- The research findings will help midsize businesses to mitigate the risks associated to ERP implementation failures and change resistance by applying relevant tools and techniques for a successful project delivery.

8.5 Generalizability

The purpose of this study was to analyse ERP adoption factors with reference to ERP implementation stages, with an objective to develop a staged adoption model that could be useful for midsize business managers. The proposed ERP implementation model is generic and does not particularly focus on a specific industry, size or type of midsize business. Thus, the model could be useful for any midsize business planning to implement ERP or application modules. Furthermore, this model could be applicable for researchers, ERP professionals and ERP project managers to assist them whilst conducting research into ERP implementations in midsize businesses.

The second stage (case study analysis) of qualitative data analysis was conducted in Australia; however the expert panel was established based on a wide range of ERP professional and academics around the world. In addition, along with three midsize businesses, one small and one large sized business, along with an SME implementer, was included in case study data analysis to relate their practical experiences with midsize business

implementation. Even though the case study was not a comparative analysis, the diversity in selection of cases enabled the researcher to identify any dissimilarity in their approaches. It was concluded that with the size and scale of a business operations, the significance of factors increases, along with time and resource implications. It was further concluded that the relevance and significance of identified factors does not change. However, in certain situations they may become more relevant.

Even though the proposed model was tested in Victoria, Australia on six case study organisations, however based on diversity of participants in the expert panel, the researcher is confident that the model shall be of some use in other industries and regions around the world.

8.6 Research limitations

This research was initiated in 2005 and the process models for ERP implementation used in this study as foundation were presented by different researchers between the years 1998-2000. The actual data collection for this study commenced in 2010 with the establishment of the Expert Panel, followed by a series of Case study interviews in 2012 with ERP professionals and the core stakeholder of a firm implementing ERP application(s). This study was conducted by the researcher over the period of nine years as a part time student, while working full time as project manager and later as ERP implementation manager.

The professional and personal commitments of the researcher restricted the data collection process at the start, however once the data collection process started, the researcher remained consistent with the delivery of results and revised the model findings accordingly. Due to sheer volume of data accumulated as a result of expert panel discussion, it was somewhat difficult for the researcher to have it thoroughly tested within one hour case study interview sessions. In addition, selection of case studies and persuading participants of the value of this study was a difficult and cumbersome process. The time constraints and financial limitations were also an issue, as the researcher had to conduct interviews in working hours. Although, in the first data collection, a wide range of ERP academics and professional participated in the Expert panel, however, the researcher believes that the second data collection process was conducted on a limited scale, capturing opinions of a limited audience from Victoria, Australia.

8.7 Future research

ERP adoption is a transitional process, commencing before the ERP adoption decision and continuing through ERP implementation stages from pre-planning through to Go live and even include a post implementation period. The scope of this study was limited to ERP implementation stages from Pre-planning through to the Go live stage. Based on process models for ERP implementation presented by other researchers, future investigation would be beneficial on post ERP implementation stages: shakedown, stabilisation, enhancement, transformation/evolution and retirements stages (Ross 1998; Esteves 1998; Markus and Tanis 2000; Parr et al., 2000).

It was clearly evident from discussions with the experts from Expert Panel and participants of the Case study analysis that activities after the Go Live stage are critical for the success of an ERP project. Furthermore, a critical analysis of factors associated to post go live stages would also bring productive value and useful information that would eventually be useful for midsize business owners and managers. This study was restricted within ERP implementation stage boundaries. Therefore, the model name was revised as an ERP implementation model for midsize business. It is important for the researcher to acknowledge and signify a need for further research in the post-implementation arena, while limiting the scope of this research within ERP implementation stages.

In this research, an attempt was made to combine ERP process research with ERP factors research and establish a workable and practical ERP implementation model that would enable midsize business managers with limited knowledge of ERP implementation issues to easily understand the process required. As stated earlier, it would also be beneficial if the final model presented by the research is further tested with a wide range of midsize business industries at different geographic locations to identify any differences of opinion and weaknesses in the presentation of data submitted in this study.

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Appendix One

Publications

10.1 Book Chapter

Alizai, Fahd and Burgess, Stephen (2010). An ERP Adoption Model for Midsize Businesses. *In: Enterprise Information Systems for Business Integration in SMEs: Technological, Organizational and Social Dimensions*. Cruz-Cunha, Maria Manuela, ed. Business Science Reference, Hershey, PA, USA, pp. 153-174. ISBN 9781605668925

Abstract

This chapter theorizes the development of a conceptual ERP adoption model, applicable to midsize businesses. The general business factors associated with ERP implementation along with the corresponding organisational benefits are identified. This chapter also highlights the constraints that confront midsize businesses whilst implementing sophisticated applications. The needs for ERP adoption can occur due to an attempt to be more competitive or due to an external pressure from large businesses to adopt an ERP application. The proposed conceptual model uses a strategic approach containing; ERP implementation processes, stages, factors & issues associate with ERP adoption in midsize businesses. This research also focuses on identification of strategies in the organisational, people and technical domains that could be influential for ERP adoption.

10.2 Conference Papers

Alizai, Fahd and Burgess, Stephen (2009). Comparative Analysis of ERP Implementation in Large and Midsize Businesses. *In: Emergent Challenges in IS/IT*. Hackney, Ray, ed. Information Institute, Las Vegas, pp. 27-1. ISBN 9781935160052

Alizai, F., Burgess, S., Hawking, P., & Sellitto, C. (2007). Developing a model for ERP systems adoption by midsize business. *International Conference on Business and Information, Proceedings of Business and Information*. 4 (2007): 1-11. Tokyo, Japan. July 1, 2007.

Appendixes Two

The Expert Panel

11.1 Appendix 5-A

Strategy:

Contact each expert informally first and request participation.

All participant who agree to participate in the focus group exercise, must be emailed with the further details with formal invitation

This provide an idea of how many experts are willing to participate

Secondly, this way we can control the start date that is decide as 27th April 2010 for now but could be changed with the change in circumstances.

Email draft to experts

Sample One

Subject: ERP in midsize research: Expert Panel additional information for "Expert A"

Dear Dr/Professor.....

First of all thank you very much for agreeing to participate in the research expert panel. This expert panel is being executed as part of my PhD study under the supervision of Dr. Stephen Burgess and Mr Paul Hawking from school of Management Information Systems from the Faculty of Business & Law at Victoria University, Australia. The title of my study is "A model for the implementation of ERP systems in midsize business". Your participation as an expert in the study will help refine our "theoretical base model" by identifying critical factors with significant impact on ERP implementation in midsize businesses.

The online discussion will start from 4th of May 2010 and will formally close on 4th June 2010, a period which comprises approximately five weeks. During each week a specific topic will be presented for discussion based on the ERP implementation stage, issues and strategies. The formal allocated period of discussion will start from Tuesday every week and will finish on following Monday. Experts will be requested to provide comments and feedback on the presented material as well as comments by other participants in accordance with their availability and convenience. Those who miss out the discussion of any week, may refer to the previous week's discussion and post their comments on that particular week, in addition to the current week.

To protect your real identities, the discussion will be executed with an anonymous identification. You are requested not to provide any personal details such as name or place of work, instead, provide your user ID (Expert XX) in the name field while submitting your comments. Your valid email address can be provided as this information will not be displayed to other participants.

Enclosed are details of 'information to participants involved in research' and 'consent form for participants involved in research'. Please to not hesitate to email me if you have any queries regarding this matter. I hope to hear a positive reply from you. Thank you.

Kind Regards,

Fahd Alizai

Given the busy schedule of all experts, the pattern of this exercise will be flexible i.e. one discussion topic per week. I would appreciate if you kindly spare sometime to participate as an ERP expert and provide your valuable comments on our proposed model for midsize businesses. Also, some ERP expert recommendations for this discussion would be greatly appreciated. A formal invitation will be later released after obtaining informal consent from each expert.

I look forward to have your favourable response.

Kind Regards,

Sample Four

Email to XXX

Dear XXX,

I hope my email finds you with best of your health and much strength devoted to your research.

I read your research paper on ERP implementation through critical success factors management, in which you used Delphi approach to valid, your research findings.

I appreciate the fact that your professional background has enabled you to blend the academic base knowledge in practice excellently.

Being a person with significant background in ERP implementation, I would like to request you to participate in my research analysis on ERP implementation in midsize business.

The approach we are trying to follow is similar to Delphi; by establishing online expert panel to discuss research topic for validation. The points discussed in your research paper are of significant importance to successful implementation of ERP. By having you as an expert will enable us to embed your vision and practical knowledge in my research perspective for validation of my model and improvement.

Given the busy schedule of all experts, the pattern of this exercise will be flexible i.e. one discussion topic per week. I would appreciate if you kindly spare some time to participate as an ERP expert and provide your valuable comments on our proposed model for midsize business. Also, some ERP expert recommendations for the panel would be greatly appreciated. A formal invitation will be later released after obtaining informal consent from each expert. I look forward to have your favourable response.

Kind Regards,

11.2 Appendix 5-B



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ERP in Midsize

ERP adoption model for midsize business

Guidelines for the Online Focus Group discussion

Discussion Start Date: 4th May 2010

Duration of exercise: Five Weeks

Introduction

This online focus group is established to discuss aspects relating to ERP implementation, specifically factors related to ERP implementation processes. The objective is to validate the theoretical base knowledge by obtaining expert opinion and to devise some strategic alternatives for midsize businesses to consider during their ERP implementations.

While participating in the discussion, experts are requested to;

Read through the information provided on each page and comment in accordance with the questions being asked in the end.

Provide comments at the "Leave a comment" section in the end.

For confidentiality reasons, please do not provide any personal information (such as, real name) instead participate with the "User ID" provided by the researcher.

Actively participate in the discussion (users can read the comments of other participants and submit multiple comments themselves).

As a minimum requirement please provide at least one comment per discussion each week.

For ease of understanding and to record the pattern of discussion, a few screen shots are provided below.

Introduction page: This is the first page providing topic details and requesting comments on ERP implementation stage

ERP implementation in Midsize Business
Focus group to obtain valuable comments on ERP implementation

HOME WEEK ONE WEEK TWO WEEK FOUR WEEK FIVE WEEK THREE

Introduction

Welcome to our focus group discussion. The purpose of this discussion is to receive important feedback from different experts and to strengthen our ERP adoption model for midsize businesses. We will include different questions regarding ERP adoption stages and the factors associated to each stage which have an impact on the ERP implementation processes. We shall also analyse the significance of different predefined strategies associated with ERP implementation and their relevance to the midsize business. As a result, the purposed model will be further refined and tested with an objective to deliver it as a blueprint or guide for midsize businesses.

ERP systems have been historically associated with implementation projects in large businesses; however there has been a trend for midsize business to also adopt ERP systems. There has been a great deal of research carried out that specifically focused upon Large Size Enterprises and the impact of such implementation but not that substantial in midsize businesses.

For the purpose of this study, a midsize business is defined as an organisation with 200-500 employees and/or an annual turnover of AU\$ 50-100 million.

11 01 2010

SEARCH

SEARCH

LINKS

S.

At the end of Introduction page, experts can either provide their comments by clicking on "[Leave a comment](#)" link **OR** continue to the next page by clicking on week one "[Model Overview](#)" for Week One discussion.

* **Installation & Go live:** Post transition support to fix glitches and implementation standards, Building networks & installation of desktops (if required), User training management.

* **Later/ Post installation:** System enhancement including repairs, extension, transformation, improvements & stabilisation phases.

This online discussion will take approximately five weeks with an intention to cover one topic per week. Each new topic will be posted every Tuesday and will be available for discussion entire week. Experts who miss the discussion of any week could refer to the previous week's discussions and post their comments in addition to the current discussion.

Lets start the discussion by clicking on week One: [Model Overview](#).

Comments : [Leave a Comment »](#)

Categories : [Intro](#)

Weekly discussion: Every week there will be some specific aspects of the model discussed to analyse their significance and request comments from experts to valid their relevance to ERP implementation.

Week One - Conceptual Model: During the first week of discussion, general aspects of the model will be discussed. The screen shot below provides a glimpse of the information being presented for discussion. The objective is to obtain professional insight from experts on the composition of the proposed model that covers "factors & processes" associated to ERP implementation in the context of small and midsize business.



Week One

ERP Implementation in Midsize Business

The literature outlines implementation models and strategies for large enterprises to have successful ERP implementations. This existing knowledge base is a useful starting point to develop a strategic ERP adoption model for midsize businesses. In the past, much ERP research was described as 'factor research' that mainly focused upon identifying *factors or variables* critical to ERP implementation. Other research focuses on *processes* that helps understand 'how' an implementation takes place. To take advantage of both perspectives, it is important to focus on an integrated approach to have a better understanding about issues relating to ERP implementation. The relationship between factors and stages is crucial to analyse the significance of different factors with the change in each stage during ERP implementation (Markus et al. 2000). This will help to assess what factors are affecting which process during certain period of time and what impact there is on the process itself. Parr et al's (2000) Project phase model and Markus et. als' (2000) process theory are useful tools to conduct the factor impact analysis while developing an ERP adoption model for midsize businesses.

SEARCH

SEARCH

LINKS

Comments Section: This section will appear at the end of each discussion page to obtain the expert opinion and to help participate in the discussion. While commenting each time, experts are requested to;

Must enter User ID at the name field (provided by the researcher)

Enter your email address; it will not be displayed to the participants

Please ignore the website field

Please provide a detailed note/response/comment/feedback. Please do not forget to review other expert comments before providing your feedback. Click submit to record your comments.

Your Comments

Please provide your comments on;

1. Are there any other ERP Adoption stages leading to successful implementation included in the list?
2. Are stated factors definition adequate to deal with the ERP adoption challenge?
3. Are there any other important factors or strategies in your opinion should be included?

Note: Remember, Each type of factors will be discussed in detail in the coming weeks.

Participants are requested not to provide any information that might identify themselves or their organisation.

Leave a comment

Name (required)

E-mail (will not be published) (required)

Website

SUBMIT COMMENT

11.3 Appendix 5-C



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INFORMATION TO PARTICIPANTS

INVOLVED IN RESEARCH

You are invited to participate

You are invited to participate in a research project entitled "A model for the implementation of ERP Systems in Midsize Businesses".

This project is being conducted by a student researcher, Fahd Alizai, as part of a Doctor of Philosophy course at Victoria University under the supervision of Dr. Stephen Burgess and Mr Paul Hawking from the Faculty of Business and Law.

Project explanation

This research investigates midsize businesses with respect to their ERP system experiences and will develop an ERP Staged Adoption model by critically evaluating the strategic issues related to ERP implementation. Given the various resource limitations associated with midsize enterprises and the potential challenges of ERP systems adoption, this study is important in focusing on the mid-market business sector.

What will I be asked to do?

Initially the study will use the online focus group method. The questions will focus on organisational, technical and human aspects of midsize business in relation to the stages of ERP implementation starting from pre-planning through to the installation stage. In order to do that, we have broken down these stages into the following;

1. **Pre-planning:** Includes business case development, application package selection, identification of project team and all decision making processes leading to financial approval for ERP project;
2. **Planning:** Project guidelines & decisions making toward ERP implementation such as, formation of steering committee, determination of project scope, resources & implementation approach and project plan development
3. **Setup & Re-engineering:** Setup includes: project team selection; selecting mix blind of people with different expertise level, teams' integration, reporting processes. Re-Engineer includes: Business process analysis, initial ERP system installation, business process mapping on ERP functions, project team training
4. **System Design:** includes; high level designing, detailed designing for user acceptance, interactive prototyping with constant communication with ERP users.
5. **Construction (Configure & Testing):** Software configuration, system integration, data conversion/migration, real data population in test instance, building & testing interfaces, writing & testing reports, system & user testing & transition,
6. **Installation & Go live:** Post transition support to fix glitches and implementation standards, Building networks & installation of desktops (if required), User training management.
7. **Later/ Post installation:** System enhancement including repairs, extension, transformation, improvements & stabilisation phases

The proposed framework will be uploaded via an online bulletin board for discussion on 4th May 2010 (Tuesday).

What will I gain from participating?

We will offer you a summarised copy of the research results.

How will the information I give be used?

The online focus group will be undertaken in order to discuss the proposed framework. Experts such as yourself will provide feedback on the proposed framework. The result and feedback from this stage combined with information raised from a literature review will be used to refine the framework.

What are the potential risks of participating in this project?

The result will be handled in strictest confidence and will be analysed only by the researchers. Your contribution will be anonymous to other participants as you will be allocated a user ID to participate in the project. The identity of the participants will be known by the researchers only. Each participant will be allocated a unique "User ID" (such as *Expert A... D...E*) that will be their only identification that will be viewed by other participants in the online focus group. The researchers will know your identity, but will not disclose it or associate any comments with specific participants in any publication or presentation of results. You and your organisation's identity will remain confidential at all times.

If participation in the study does not comply with any local laws, customs or reasonable expectations in your country then the relevant discussion will be excluded from the study. You can withdraw from the study at any stage or decline to answer a question if you are not comfortable with it.

How will this project be conducted?

Participants that are colleagues of the principal investigator or are well-known in the fields of midsize business, ERP research or ERP implementation experts and/or ICTs from universities in Australia and globally are being invited to participate in the focus group. Upon acceptance, you will be asked to comment on various stages of the framework in different rounds (which will each run for one week) by remarking upon the factors involved at each stage and also on comments made by other online focus group participants. It is anticipated that there will be five rounds in the study (and thus it will run for five weeks).

Who is conducting the study?

This study is being conducted by Fahd Alizai (project code: **HRETH 07/125**) under supervision of Principal Supervisor, Dr. Stephen Burgess.

Any queries about your participation in this project may be directed to the Principal Researcher listed above.

If you have any queries or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone (03) 9919 4781.

11.4 Consent Form



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FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

This e-mail is to invite you to be a part of a PhD study, "A Model for the Implementation of ERP systems in midsize businesses". This study requests that you to participate in an online focus group discussion that will seek your view points and comments on the proposed framework. Your input will be extremely valuable to help us discover what could be improved in ERP implementations in midsize businesses. The online focus group will seek your views on a range of elements in proposed framework that will be uploaded via an online bulletin board at the selected commencement date. If you decide to participate in this research study, you will be asked to take part in an online focus group discussion with the researcher.

CERTIFICATION BY SUBJECT

I, _____ of

certify that I am at least 18 years old and an academician/practitioner in that related area (small midsize business and/or ERP implementation) * and that I am voluntarily giving my consent to participate in the PhD study (project code: HRETH 07/125) being conducted at Victoria University by: Dr. Stephen Burgess and Fahd Alizai on the topic of "A Model for the Implementation of ERP Systems in Midsize Businesses"

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by Fahd Alizai and that I freely consent to participation involving the below mentioned procedures.

The online focus group will be conducted by Fahd Alizai and viewpoints will be grouped in common themes and/or notes taken as a mean of recording data. I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way. I can also decline to answer any question that I am not comfortable with answering. I have been informed that the information I provide will be kept confidential. I also understand that if participation in the study does not comply with any local laws, customs or reasonable expectations in your country then my contributions to the discussion will be excluded from the study.

**** I have read the consent e-mail above and I consent to be a part of the study. I agree to comments and viewpoints from this online focus group being published.**

**please respond your consent to participate in the study via email to fahd.alizai@research.vu.edu.au

Any queries about your participation in this project may be directed to the researcher

(Principal supervisor: Dr. Stephen Burgess: Ph. +61 3 9919 4353, or PhD candidate: Fahd Alizai : Ph. +61 402 171417).

If you have any queries or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone (03) 9919 4781.

Appendix Three

Case study interviews

12.1 Appendix 6-A

*(Case Name responses colours: **No Comment**, **Experienced**, **Agreed/Recommended**, **Changes per Experience**)
 (Case-Name**: Suggested factor deletion) ***(**Factor italic**: New factor added), ***(**Factor Non-italic**: Moved within model)

Factors for ERP adoption	Pre-planning Stage – Revised
Technology Factors	Business requirements identification– LE1, LE2(<i>business process recording</i>), MID-1, MID-2, SME implementer, SME, MID-3 Technical requirements analysis LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Technical requirements identification LE1, LE2, MID-1 , requirement statement – current state and what they want) SME implementer, MID-2, SME, MID-3 Business & Technology Issues; LE1, LE2, MID-1, SME implementer (50-50%), MID-2, SME, MID-3 Application understanding & usefulness LE1, LE2, MID-1, (use case based – interest are short listed) SME implementer, MID-2, SME, MID-3 Impact of technology LE1, LE2 (in business), MID-1, SME implementer (difficult to measure) MID-2, SME, MID-3 Integration requirements (SME impl) Accurate information on ERP applications (LE2) Identify value stream for organisation. (MID-1 –up from planning) Selection criteria with relevant parameters (MID-1 –up from planning) Accurate information on ERP applications (MID-1 –up from planning) Data migration –MID-2 Early development of strategy – MID-2 Strategy Communication – MID-2 Existing state -> new application (legacy to new change) – MID-3
Organisational Factors	Organisational Knowledge LE1, LE2, MID-1, MID-2, SME implementer, SME MID-3 Business functional knowledge LE1, LE2, MID-1, (clearly define what needed MID-1) (business process knowledge SME implementer), MID-2, SME implementer, SME, MID-3 (business matrix) Broad Agenda -> Business Benefit roadmap – MID-3 Strategy for Organisation – MID-3 Develop Strong business case LE1, LE2, MID-1, (relevant to companies more than 250 staff. Small midsize do not develop business case – SME implementer, MID-2, SME, MID-3 Cross organisational business functions LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Organisational Political support LE1, LE2, MID-1, MID-2, SME implementer, SME, MID-3 Change and Risk Analysis; LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Stakeholder expectation Analysis: LE1, LE2 (in fit-gap), MID-1, SME implementer Stakeholder expectation Analysis; (check staff for prospect) – SME-1, MID-2, SME, MID-3 Strategic Management Issues; LE1, LE2, MID-1, SME implementer, MID2, SME MID-3 External Organisational factors LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 Macro environmental factors; LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 Effective Communication strategy based on who what when how (LE1) Effective technique for communication such as survey (LE1) Executive Management Commitment (clearly present) (LE1) Budget Estimates (tentative dollar figures) – MID-3 Stakeholder expectation Analysis: engagement plan – MID-3 Business Objective and direction -> Business strategy – MID-3
People Factors	Limited resources (Skills) – LE1, LE2 higher level, MID-1 SME implementer, (planning) MID2, SME, MID-3 Communication Strategies – LE1, LE2 later done, MID-1 SME implementer (planning) MID2, SME, MID-3 Conflict resolution procedures – LE1, LE2 (not done but should), MID-1, SME implementer (Planning) MID2, Business demonstration – resource size and skills – MID-3 Resource Management Plan – MID-3 Resource backfill planning by business – MID-3 Project Resource size Planning (type nature skill) – MID-3 Identify limited resources (Skills) – MID-3 What ERP will do to people SME impl Business case foundations – people impact SME impl Efficiency brought by ERP to people SME impl Return on investment (ROI) SME impl Processes improvement SME impl Conflict existence SME impl

12.2 Appendix 6-B

Factors for ERP adoption	Planning Stage - Revised
Technology Factors	<p>Selection criteria with relevant parameters – LE1, LE2, MID-4, SME implementer, MID2, SME, MID-3 <i>(LE1-Organisational procurement procedures, Shortlisting)</i> <i>(LE2- requirement based tender process)</i> <i>MID-3- Business critical viewpoints (functional, technology and vendor support availability)</i></p> <p>Accurate information on ERP applications-LE1, LE2, MID-4, SME implementer, MID-2, SME, MID-3 <i>(LE1 - market reference site visits)</i></p> <p>Less reliance on sales advice -LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 <i>(LE1-Market test, ref sites)(MID-1-Highly relied)</i></p> <p>Time & Cost of implementation – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>(LE1- identify overall)</i></p> <p>New technology adoption issues – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>SME Implementer - Mobility, Higher Availability, Complexity, Network, Servers, PCs required, other ICT infrastructure required</i></p> <p>Industry standards -LE1, LE2, MID-1, SME implementer, MID2 <i>(LE1-based on ERP standards), SME, MID-3</i></p> <p>Proposed application System architecture analysis LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>(LE1-Didn't perform and should perform next time)</i></p> <p>Technical staff/consultant expertise LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 <i>(LE1 -didn't perform later in planning)</i></p> <p>Realistic 'end user' expectation analysis <i>(Minimal or no customisations)</i> – LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 <i>(LE1- Very Higher level analysis possible at this stage)</i></p> <p>Identify value stream for organisation - LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3 <i>(LE1-Fit gap workshop to start and plan. Further in Build stage)</i></p> <p>Technical requirements identification – LE2 Technical requirements analysis – LE2 Decision on Testing Tools – QC (QA, QM protocols set) – LE2 Data Migration Strategy development – LE2 Data migration strategy communication & feedback – LE2 Plan for testing and identify Tools required for Testing QC– LE2 Planning Decisions should be Made – MID-1 Engage with partners – SME implementer Define compatibility issues with other applications – SME implementer Identify Applications for Integration – SME implementer ERP complexity management planning; – SME implementer ----- END of Planning and before next stage ----- Establish infrastructure strategy – Technology requirements – SME implementer Establish Application Integration strategy – SME implementer Establish Data migration Strategy – SME implementer Data validation, verification and cleansing – SME implementer Time & Cost of implementation (software cost) end of this stage these were known – MID-2 <u>Data migration – MID-1</u> Early development of strategy Strategy Communication <u>Application integration – MID-1</u> Identify systems for integration</p>

Factors for ERP adoption	Planning Stage - Revised
Organisational Factors	<p>Cultural factors (local, national) - LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3</p> <p>Government or regularity change LE1, LE2, MID-1, SME implementer, MID2, LE1, SME, MID-3</p> <p>External environmental factors LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3</p> <p><u>Project Management</u>; LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3</p> <p><i>Detailed project plan & communication strategy</i> LE1, LE2, MID-1, SME implementer, MID2, MID-3</p> <p><i>Project Leadership (risk & issues)</i> LE1, LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Clear & well defined objectives (Scope)</i> LE1, LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Develop Organisational change management</i> LE1, LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Risk Planning & Monitoring</i>; LE1, LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Effective Communication strategy, based on 'who, what, when and how'</i> LE1, LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Effectiveness techniques for communication (survey)</i> LE1 (preplanning), LE2, MID-1, SME implementer, MID-2, MID-3</p> <p><i>Limited Resources (Budget)</i> LE1 (pool of internal staff), LE2, MID-1, SME implementer, MID-2, MID-3</p> <p>Executive Management Commitment LE1, LE2, MID-1, SME implementer, MID2, SME, MID-3</p> <p>Business impact analysis, LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Definition of individual and collective benefits, LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Cross organisational business functions – LE2</p> <p>Plan Time & Cost of implementation - SME implementer</p> <p>Identify value stream for organisation - SME implementer</p> <p>Change and Risk Analysis SME implementer</p> <p>Stakeholder expectation Analysis - SME implementer</p> <p>Strategic Management Issues - SME implementer</p> <p>External Organisational factors - SME implementer</p> <p>Macro environmental factors - SME implementer</p> <p><i>Establish project Governing Principles as part of Charter (no customize) - SME implementer</i></p> <p><i>Clear idea of Cost of implementation at end of this Stage – MID-3</i></p>
People Factors	<p><u>Analysis of User support base for application</u> - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3,</p> <p>Limited resources (people/skill) LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3,</p> <p>Effective time management LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>> <u>Resource utilisation details</u> – MID-3</p> <p><u>Change Management</u>; LE1, LE2, MID-1, SME implementer (LE1&2 –initiate here plan here done later), MID-2, SME, MID-3</p> <p>Clarity in Communication LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><u>Team Management & Control structure</u> – LE1</p> <p><u>Team Building</u> LE1, LE2, MID-1, MID-2, SME, MID-3, SME implementer (Build team)</p> <p><u>Team Competence</u> LE1, LE2, MID-1, MID-2, SME, MID-3, SME implementer (Develop competency matrix)</p> <p><u>Training strategies</u> LE1, LE2, MID-1, MID-2, SME, MID-3, SME implementer (Develop training strategies)</p> <p><u>Incentives with deliverables</u> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Conflict resolution procedures (at very early stage of planning) – LE2</p> <p><i>Plan for testing and identify staffing requirements</i> – LE2</p> <p><i>Develop Testing Strategy, Test plan, test scenarios and test cases record them in Testing Tool like QC</i> – LE2</p> <p>Realistic 'end user' expectation analysis (Minimal or no customisations) – SME implementer</p> <p>Limited resources (Skills) - SME implementer</p> <p>Develop Communication Strategies - SME implementer</p> <p>Develop conflict resolution procedures - SME implementer</p> <p>Develop Knowledge management strategy - SME implementer</p> <p><i>Allocation of staff on project for Knowledge Transfer</i> - SME implementer</p> <p><i>Internal and external team engagement planning</i> - SME implementer</p> <p><i>Develop Testing Strategy</i> - SME implementer</p> <p><i>Identify key business user - testing resources</i> - SME implementer</p> <p><i>Identify key business staff for UAT</i> - SME implementer</p> <p><i>Define Post Go Live support structure (high level strategy)</i> - SME implementer</p> <p>Commitment from department resources (business) – MID-3</p> <p>Resources engagement (technical, functional) – MID-3</p> <p>Package Selection design and Contract signing – MID-3</p> <p>(STAGE GATES – BASELINE and ACHIEVE) – MID-3</p>

12.3 Appendix 7-A

Factors for ERP adoption	Build Stage (Set-up, Re-engineer, Functional and System Design, Blue print/ Fit gap)
Technology Factors	<p>ERP complexity – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>(LE1- fit gap analysis – planning to build stage, Organisation and Vendor planning)(Clarity in direction)</i> <Technical Lock Down – MID-3 Vendor selection -> finalise technical requirements -> sizing -> procure servers and other technology – MID-3></p> <p>In house expertise – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>(Identify training requirements – SME implementer)</i></p> <p>Cost of implementation – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>ERP compatibility issues with other applications- LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 <i>(Integration issues)</i></p> <p>Development of a system design strategy- LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Business & Technology Issues – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3, <i>(LE2 – not through until Construct phase)</i></p> <p><u>Data migration – LE1</u> Early development of strategy – LE1 Strategy Communication– LE1 Data quality analysis & data cleansing– LE1 <u>Application integration (Identify) – LE1</u> Identify systems for integration– LE1 Data quality analysis and cleansing start – LE2 ERP installation aspects – LE2 <i>Establishing of Testing strategy, testing processes, script creation and recording. LE2</i> Identify systems for integration LE2 Application Integration LE2 ERP installation aspects; MID-1 Cost of implementation - MID-1 =>JDE Flying Blind- MID-1 <i>CRM know the product, more change to appeal and process - MID-1</i> <i>Major impact in Stage 2, Business Analysis - MID-1</i> <i>Technical and infrastructure Strategy definition (SME implementer)</i> <i>Integration points – identify systems for integration – SME implementer</i> Build use case maps– SME implementer Show product in design– SME implementer Customisation and development required– SME implementer Data migration – revision/update– SME implementer Data Quality and Data Cleansing exercise – ongoing– SME implementer Data structures establishment for migration– SME implementer ERP installation aspects– SME implementer <i>Server to Data Centre in Brisbane – MID-2</i> <u>Data migration MID-3</u> Early development of strategy MID-3 Strategy Communication MID-3 Establish requirements & Sampling MID-3 Application Integration MID-3 Identify systems for integration MID-3</p>
Organisational Factors	<p>Cost of implementation - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Limited Resources (Budget) - LE1, LE2, MID-1, SME implementer(refine only), MID-2, SME, MID-3</i></p> <p>Situational Leadership issues - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Issues due to Mergers/ Acquisitions – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Cross dimensional factor impact – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><u>Project Management:</u> - LE1, LE2, MID-1, SME implementer</p> <p><i>Project monitoring & control-</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Risk Monitoring;</i> - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Stakeholder expectation management-</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Effective Communication & Coordination;</i> - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Organisational change management-</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Organizational resources management -</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Organisational structure definition - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Organisational Ideology; - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3, <i>(LE1- impact on Status Quo – change mgf)</i></p> <p>Effects of managerial style LE1, LE2, MID-1, SME implementer</p>

Factors for ERP adoption	Build Stage (Set-up, Re-engineer, Functional and System Design, Blue print/ Fit gap)
	<p>(LE1 – people factor and move from here), MID-2, SME, MID-3 Stakeholder expectation analysis – LE1 Information system function– LE2 Effective organisational level communication and coordination– LE2 Organisational change management– LE2 Detail Design: functional details, processes, fit gap – business process functionality – MID-3 Expand on Strategy for <u>Governing Principles</u> SME implementer Business process change or customisations - SME implementer Scope management – SME implementer</p>
People Factors	<p><u>Limited Resources (People/Skill)</u> - LE1, LE2, MID-1, SME implementer Trained business staff - LE1, LE2, MID-1, SME implementer (before go live), MID-2, SME, MID-3 Professional external consultants- LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Temporary staff to backfill existing business staff - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 In-house expertise - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Skill match assessment – knowledge transfer – SME implementer Establish training strategy -> build training plans – SME implementer Team Building – MID-3 added Team Competence – MID-3 added Team management & control - LE1 (in planning), LE2, MID-1, SME implementer, MID-2, SME, MID-3 Dedicated resources for testing (people/skill) – LE2, (An ability to fix defects in testing) – LE2 <u>Change Management</u> Business support for UAT team – LE1 (construct), LE2, MID-1, SME implementer, MID-2, SME, MID-3 Staff attitude to change – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Management attitude– LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Organisational Staff engagement– LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Clarity in communication – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Communication transparency – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Internal & external team engagement – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 Effects of managerial style (important +ve or -ve) – LE1 Training strategies (execute later) – LE2 Plan for User Acceptance Testing as part of Test strategy – LE2 Prepare for UAT – define UAT management strategy – SME implementer</p>

12.4 Appendix 7-B

Factors for ERP adoption	Construction Stage (Configuration, Development, testing)
Technology Factors	<p>ERP installation aspects – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Cost of implementation (<i>continuously revised</i>– LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 (revise))</p> <p><u>Data migration</u> – LE1, LE2, MID-2, SME, MID-3</p> <p><i>Early development of strategy</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Strategy Communication</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Data quality analysis & data cleansing</i> LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Prepare live data for testing</i> – MID-3</p> <p><i>Data manipulation in CSV – after migration recharge</i> – MID-2</p> <p><u>Application integration</u>(start integrating) LE1, LE2, SME implementer (performing/ doing), MID-2, SME (not required)</p> <p><i>Identify systems for integration</i> LE1, LE2, MID-1, SME implementer, MID-2, SME (not required), MID-3</p> <p><i>Integrate and test integration</i> – SME implementer</p> <p><i>Integrate Applications (Recharge module integration, SAP couldn't do it – big issue)</i> – MID-2</p> <p><i>Perform System integration</i> - SME</p> <p><i>Integration Testing</i> – MID-3</p> <p>Business & Technology Issues (full impact) – LE1, LE2</p> <p>Data migration & Validation – LE1, LE2(<i>doing</i>),</p> <p>ERP complexity; - LE2</p> <p><i>Quality Assurance and Quality Management (work flow management, Testing, bug fixing, Tracking, QC)</i> – LE2</p> <p>Perform App Integration – MID-1</p> <p>Effectiveness of inter-organisational system integration – MID-1</p> <p><i>Early start: Migration trial and cleansing process to get data ready for system</i> – SME</p> <p>Data migration – practically performing, doing – SME implementer</p> <p><i>Repetitive data cleansing cycles</i> – SME implementer</p> <p><i>Improve data quality and data structures</i> – SME implementer</p> <p>Ongoing SDLC process – MID-3</p> <p>Interface system information– MID-3</p> <p>System Testing– MID-3</p> <p>Prototyping for testing– MID-3</p> <p>Testing with live data– MID-3</p>
Organisational Factors	<p>Limited Resources (Budget) – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Issues due to Mergers/ Acquisitions – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Cross dimensional factor impact – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Information System Function – LE1, LE2, LE1 (<i>UAT validation</i>), SME implementer, MID-2, SME, MID-3</p> <p>Effective Communication & Coordination – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Project monitoring & control – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3 (<i>Reporting</i>)</p> <p>Organisational Change Management – LE1, LE2(<i>monitoring</i>), MID-1, SME implementer (<i>doing change, plan early</i>), MID-2, SME, MID-3</p> <p><i>Cost tracking and updates</i> – SME implementer</p> <p><i>Impact of scope change on project</i></p>

Factors for ERP adoption	Construction Stage (Configuration, Development, testing)
People Factors	<p>Limited Resources (Skill); - LE1, LE2, MID-1, SME implementer, MID-2, SME, <i>Staff Training (functional and for UAT) – MID-3</i></p> <p>Staff (end user) Involvement; - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>In-house expertise; - LE1, LE2 (gradually improve), MID-1, , SME implementer (KM, Knowledge transfer), MID-2, , SME, MID-3</p> <p>Communication transparency - LE1, LE2, MID-1, SME implementer (doing), MID-2, , SME, MID-3</p> <p>Internal & external team engagement - LE1, LE2, MID-1, SME implementer, , MID-2, SME, MID-3</p> <p><i>Allocate</i> Dedicated resources for testing UAT (people/skill) - LE1, LE2, MID-1, SME implementer (allocate UAT), MID-2, SME <i>(An ability to fix defects in testing) – track-ERP implementer, MID-2, SME, MID-3</i> <i>identify people in past and now using them to perform testing – ERP implementer</i></p> <p>Key users involvement for testing - LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>Change Management (on people) – LE1, LE2 (perform CM)</i></p> <p>Business support for UAT team (on gong) – LE1</p> <p>User Acceptance Testing – identify staff and train – LE2</p> <p>User support base for application (done later) – LE2</p> <p>Perform User Acceptance Testing from identified staff – LE2</p> <p>End user engagement – SME implementer</p> <p>UAT management – perform UAT - SME implementer</p> <p>System Testing – MID-3</p> <p>Resource plan for testing (PEOPLE) - MID-3</p> <p>Key users involvement for testing - MID-3</p> <p>Dedicated resources for testing – MID-3</p> <p>Impact of Change on staff – MID-3</p> <p>Internal & external communication (supplier/ partners) – MID-3</p> <p><u>Operational implication analysis</u> – MID-3</p> <p>Succession planning - MID-3</p> <p>Knowledge management for ERP maintenance/support - MID-3</p>

12.5 Appendix 7-C

Factors for ERP adoption	Go Live Stage - Revised (<i>sign off stage</i>)
Technology Factors	<p>ERP implementation issues (Update); - LE1, LE2, MID-1, MID-2, SME, MID-3</p> <p>Business & Technology Issues (Update) - LE1, LE2 (<i>hand over issues</i>), MID-1, MID-2, SME, MID-3</p> <p><u>Operational implication analysis</u> - LE1, LE2 (<i>monitor change 12-18 months</i>), MID-1, MID-2 (50-50%), SME, MID-3</p> <p><i>Knowledge management for ERP maintenance/support</i> - LE1, LE2, MID-1, MID-2, SME, MID-3</p> <p><i>Effectiveness of inter-organisational system integration</i> - LE1, LE2, MID-1, MID-2, SME, MID-3</p> <p><i>SME Implementer – No comments. Suggested name change to Sign Off</i></p> <p><i>Support Program implace with experienced consultant – MID-1</i></p> <p><i>Training programs for staff (ongoing) – MID-1</i></p> <p><i>Usage of legacy application in parallel and keeping data in accessible mode for longer period.- SME</i></p> <p><i>Support Staff Post Go Live and Hand Over requirements – MID-3</i></p> <p><i>Vendor/Project Team hand over to business/operations– MID-3</i></p> <p><i>Post Go Live internal support for applications– MID-3</i></p> <p><i>(Issues post go live – the figures not balances when went live. Urgent assistance to fix the glitch, Payroll – Good, Payment receivable – Fine) – MID-2</i></p>
Organisational Factors	<p>Strategic Management Issues (Update) –LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Change strategies (Update) –LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Risk Management (Update) –LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Effective Communication –LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Project monitoring & control -LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Organisational change management -LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><u>Operational implication analysis</u> –LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p><i>ERP business functional impact</i> –LE1, LE2, MID-1 (<i>Simple to complex, far exceed worst case scenarios</i>), SME, MID-3</p> <p><i>Approval to Go Live – SME implementer</i></p> <p><i>Sign off from Business & Management – Most senior stakeholders to provide Go Live sign off (take a decision) - SME implementer</i></p> <p><i>Business Expectation Assessment to validate implementation (whether the expectation was achieved?) - SME implementer</i></p> <p><i>* Testing, writing manual and sharing info with staff –MID-2</i></p> <p><i>Future changes/enhancements/left over items – MID-3</i></p> <p><i>Left over scope items - - MID-3</i></p> <p><i>Prioritisation of to be completed items– MID-3</i></p>
People Factors	<p>Staff attitude to change (Update) – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>Management attitude (Update) – LE1, LE2, MID-1, SME implementer, MID-2, SME, MID-3</p> <p>End user engagement- LE1, LE2 (<i>hand holding</i>), MID-1, SME implementer, MID-2, SME, MID-3</p> <p><u>Operational implication analysis</u>- LE1, LE2, MID-1, SME implementer, MID-2, SME (50% only done), MID-3</p> <p><i>Succession planning</i>- LE1, LE2 (<i>18 months</i>), MID-1, MID-2, SME, MID-3</p> <p><i>Knowledge management for ERP maintenance/support</i> – LE1, LE2, MID-1, MID-2 (<i>maintenance and support</i>) * <i>Purchased hours of services with contractors post go live. Lose agreement of support * Purchase 10 hours and keep adding up * Use hours for technical and staff development services.</i> SME, MID-3</p> <p><i>Comment: Whatever system, whoever will use it must be involved – MID-1</i></p> <p><i>Analyst business expectation achievement – SME implementer</i></p> <p><i>Operations plan how to hand over to operations, – post go live structure discussion – Strategy define in Planning phase - SME implementer</i></p> <p><i>Training strategies and effectiveness (Update) – SME</i></p> <p><i>must identify needs early and engage trainer early</i></p> <p><i>Slow down efficiency of using new app, increased speed with time – SME</i></p>