EXPLORING THE ACCEPTANCE OF ENTERPRISE RESOURCE PLANNING SYSTEMS BY SMALL MANUFACTURING ENTERPRISES

by

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In Appreciation

"*Only one who devotes himself to a cause with his whole strength and soul can be a true master. For this reason mastery demands all of a person*." ~ Albert Einstein

Research is not an individual undertaking. It is a grand endeavour that is supported by a 'dream team' made up of a multitude of individuals that inspire one to master their abilities. Words alone cannot express my sincere gratitude to everyone who has touched my life and made this journey a memorable and rewarding one.

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With heartfelt gratitude,

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Abstract

The use of enterprise resource planning (ERP) systems by small enterprises is proliferating. Traditionally used by large enterprises, ERP systems are now considered important enterprise management aids, which may contribute to the sustainability and growth of small enterprises. Although varying acceptance factors may impact on the acceptance of ERP systems, there is no consolidated list of ERP system acceptance factors specific to small enterprises. In this study, the strategic, business, technical and human factors that influence the acceptance of ERP systems in small manufacturing enterprises in South Africa is presented. These influencing factors may guide future initiatives aiming to ensure the acceptance of ERP systems by small manufacturing enterprise. A combined quantitative and qualitative data analysis approach was used as an analytical lens to interpret responses gathered from small manufacturing enterprises. Recommendations are made for future research on ERP system acceptance and adoption within the broader spectrum of small enterprises.

Keywords

Enterprise resource planning systems, small and medium enterprises, small enterprises, small manufacturing enterprises, technology acceptance model, unified theory of technology acceptance model, enterprise resource planning acceptance factors

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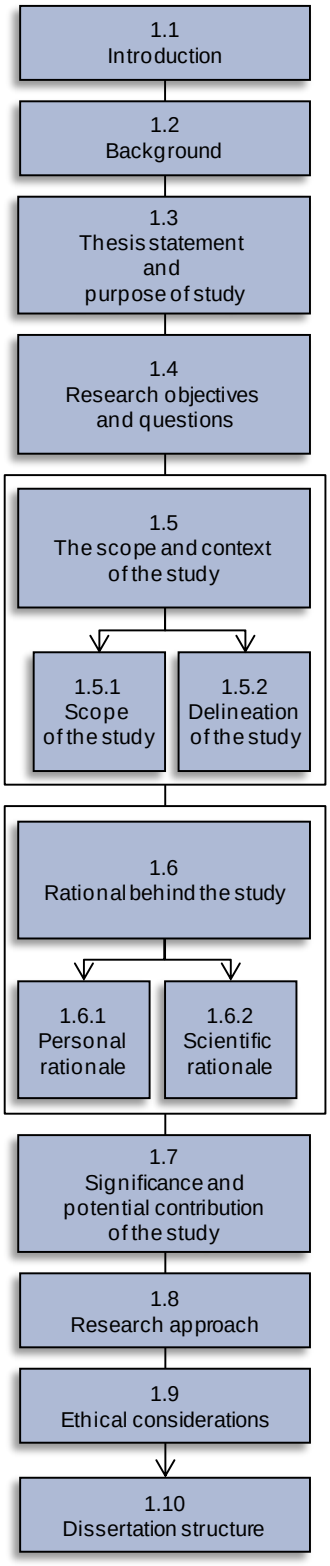
CHAPTER 1: INTRODUCTION

Map of Chapter 1



1.1 INTRODUCTION

The focus of this study is the identification of acceptance factors of enterprise resource planning (ERP) systems by small manufacturing enterprises. ERP systems are defined as 'software systems for business management, encompassing modules supporting functional areas such as planning, manufacturing, sales, marketing, distribution, accounting, financial, human resource management, project management, inventory management, service and maintenance, transportation, and e-business' [Rashid, Hossain, & Patrick, 2002]. The ability to view integrated enterprise-wide information encouraged large enterprises to invest in ERP systems [Botta-Genoulaz & Millet, 2006]. According to Botta-Genoulaz and Millet [2006] and Equey and Fragnière [2008] the market for ERP systems for large enterprises is now saturated and ERP system vendors are competing in terms of marketing ERP systems that cater to the needs of small and medium enterprises.

In this research, the focus is on ERP system acceptance by small enterprises, which is different from large enterprises and 'cannot be considered scaled-down larger ones'. Small and medium enterprises operate within a 'flexible and informal environment' [Laforet & Tann, 2006, p. 374] and formalised processes typical in large enterprise are not necessarily applicable in small and medium enterprises. The dynamic needs of small and medium enterprises should be considered as this influence the acceptance of ERP systems.

In this chapter, the purpose of the research is introduced. First, a background on ERP systems, technology acceptance and small manufacturing enterprises addressed in this research is given in Section 1.2. This is followed by a presentation of the thesis statement in Section 1.3. The research questions that need to be addressed in order to fulfil the purpose and objectives of the study are given in Section 1.4. The scope and context of this study is discussed in Section 1.5, followed by the rationale for conducting this study, from both a personal and scientific perspective, which is presented in Section 1.6. The significance and potential contribution of this study to the body of knowledge is discussed in Section 1.7. An overview of the research approach is given in Section 1.8, followed by a discussion of the ethical considerations that need to be considered in Section 1.9. This chapter concludes with a concise overview of the dissertation structure presented in Section 1.10.

1.2 BACKGROUND

Traditionally ERP systems were synonymous with large enterprises [Botta-Genoulaz & Millet, 2006]. This trend is changing as small and medium enterprises have started to use ERP systems in order to be more competitive and responsive to business demands and to improve operational

performance [Koh & Simpson, 2005; Loh & Koh, 2004; Muscatello, Small, & Chen, 2003]. Small manufacturing enterprises operate with limited resources and there is an urgency to reduce costs, streamline operations and strive for excellence [Ziaee, Fathian, & Sadjadi, 2006] as many small manufacturing enterprises interact within the supply chains of larger manufacturing enterprises [Deep, Guttridge, Dani, & Burns, 2008; Loh & Koh, 2004].

Another reason for the use of ERP systems by small enterprises is to leverage enterprise growth [Buonanno, et al., 2005; Deep, et al., 2008; Loh & Koh, 2004; Reuther & Chattopadhyay, 2004]. Figure 1 illustrates a perceived notion of introducing ERP systems in small enterprises in anticipation of this leading to increased enterprise growth and continued ERP system adoption.

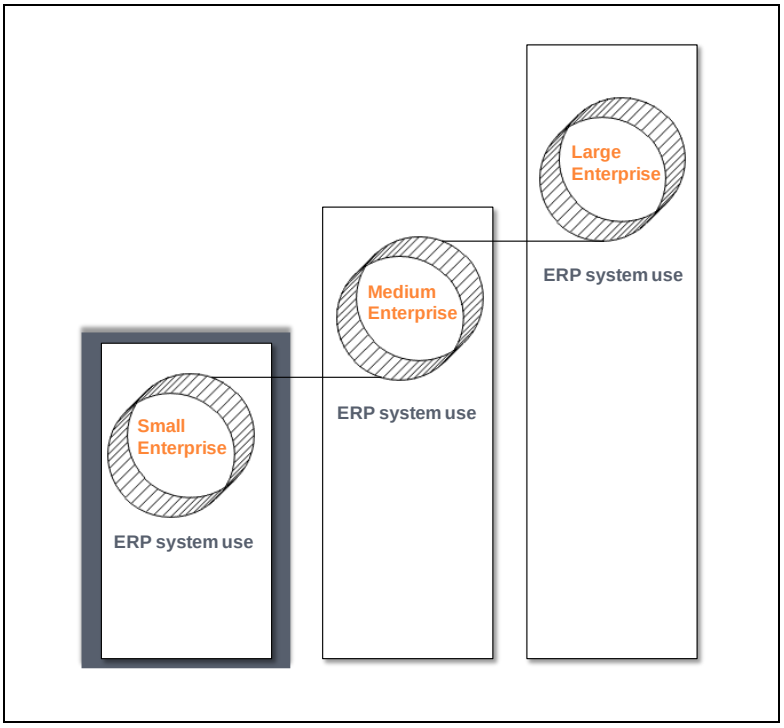


Figure 1: Use of ERP systems at different levels of enterprise maturity

Although research has been carried out on ERP system acceptance and adoption [Amoako-Gyampah, 2007; Bernroider & Koch, 2000; Equey & Fragnière, 2008], very little research has been done on the acceptance of ERP systems by small enterprises [Iskanius, Halonen, & Möttönen, 2009; Malhotra & Temponi, 2010; Muscatello, et al., 2003]. This lack of research can be attributed to the fact that ERP systems were rarely used by small enterprises due to 'knowledge and resource constraints' [Malhotra & Temponi, 2010, p. 30] and only recently started to gain popularity and to draw interest. An understanding of the factors that influence the acceptance of ERP systems in small enterprises should help researchers and industry to develop and distribute ERP systems to the small enterprise market.

A review of literature resulted in the identification of three main types of acceptance and critical success factors:

- *Technology acceptance factors* [Amoako-Gyampah, 2007; Amoako-Gyampah & Salam, 2004; Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Gordon, & Davis, 2003].
- *ERP system selection and acquisition factors* [Abdinnour-Helm, Lengnick-Hall, & Lengnick-Hall, 2003; Deep, et al., 2008; Malie, Duffy, & van Rensburg, 2008; Verville, Bernades, & Halingten, 2005].
- *ERP system implementation and use* [Akkermans & Helden, 2002; Al-Mashari, Al-Mudimigh, & Zairi, 2003; Bernroider & Leseure, 2005].

Due to varying acceptance factors, identified across a number of information system research domains that focus on technology acceptance, there is no cohesive list of ERP system acceptance factors available. The aim of this study is to bridge the gap in fragmented views on ERP system acceptance, and explore the subject of ERP acceptance by small enterprises further.

1.3 THESIS STATEMENT AND PURPOSE OF STUDY

The limited understanding of ERP system acceptance by small manufacturing enterprises provides numerous research possibilities. In this study, the focus is specifically on the acceptance of ERP systems in small manufacturing enterprises, with the thesis statement defined as:

The acceptance of ERP systems by small manufacturing enterprises in South Africa is influenced by strategic, business, technical and human factors.

The key objective is to consolidate and propose a list of factors (strategic, business, technical and human) that may be incorporated into initiatives aimed at ensuring acceptance of ERP systems by small manufacturing enterprises. The resulting list of acceptance factors may still be expanded in future studies. The proposed list of ERP system acceptance factors is a first step towards providing a categorised account of ERP system acceptance findings from literature together with ERP system acceptance findings collected during this research.

The desired outcome of this study is to contribute to an enhanced understanding of acceptance of ERP systems by small manufacturing enterprises and to contribute to a positive view regarding the acceptance of ERP systems by small enterprises.

1.4 RESEARCH OBJECTIVES AND QUESTIONS

In order to meet the objective of compiling a list of ERP system acceptance factors for small manufacturing enterprises, one main research question (MRQ) and three sub research questions (SRQ) were identified:

MRQ: What are the perceived factors that influence the acceptance of ERP systems by small manufacturing enterprises?

The objective of the main question is to gain a unified understanding of the use and expectations for using ERP systems. The question seeks to consolidate the views of small manufacturing enterprises that use ERP systems with those of small manufacturing enterprises that have not used ERP systems but expect to use an ERP system in the future. The first SRQ is defined as:

SRQ1: What is the current status of research on the acceptance of ERP systems by small manufacturing enterprises?

The *objective* of SRQ1 is to explore literature that focuses on ERP system acceptance by small manufacturing enterprises. A motivation for addressing this question is to identify current gaps in knowledge that can be addressed by this study.

The second SRQ investigates ERP system acceptance factors of small manufacturing enterprises that use ERP system and is defined as:

SRQ2: What factors influence the acceptance of ERP systems by small manufacturing enterprises that use ERP systems?

The *objective* of SRQ2 is to explore the factors that influence the use of ERP systems by small manufacturing enterprises. These small manufacturing enterprises could be enterprises that have previously used or currently use ERP systems.

The third SRQ investigates ERP system acceptance factors of small manufacturing enterprises that have not used ERP systems and is defined as:

SRQ3: What are the expectations that influence the acceptance of ERP systems by small manufacturing enterprises that have not used ERP systems?

The *objective* of SRQ3 is to explore the expectations of small manufacturing enterprises when deciding to use an ERP system. A condition related to this SRQ is that these small manufacturing enterprises should not have any experience in using ERP systems.

1.5 THE SCOPE AND CONTEXT OF THE STUDY

The scope and context of this study is exploring the acceptance of ERP systems by small manufacturing enterprises in South Africa. Section 1.5.1 indicates the scope of the study and Section 1.5.2 presents the delineation of the study.

1.5.1 Scope of the study

This study is a survey that is exploratory and short-term in nature. The study is not intended to be a long-term, large scale comparative survey of the acceptance of ERP systems. It will only explore ERP system acceptance factors within the strategic, business, technical, and human categories. The focus is on pre-implementation as well as post-implementation ERP system acceptance factors only. This means that small enterprises that have used, that are using and that intend to use ERP systems can be approached to participate in the study. ERP system adoption factors will not be looked at, even though the concepts of technology acceptance and technology adoption are closely intertwined.

1.5.2 Delineation of the study

The research was carried out in the province of Gauteng in South Africa. The preference for selecting the province of Gauteng is because Gauteng is regarded as the main economic hub of South Africa. Furthermore, it was possible to sample and communicate with small manufacturing enterprises in Gauteng more easily and conveniently compared to other provinces in South Africa. Due to schedule and budget constraints, it would not have been feasible to sample small manufacturing enterprises from all provinces in South Africa. Only small manufacturing enterprises formed part of the study. Small enterprises within other industries are excluded from the study, as they do not support the research rationale (Section 1.6.2). Small manufacturing enterprises that have used, are using or intend to use ERP systems could participate in the study. Only small enterprise ERP system consultants were invited to participate in an interview to comment on the findings from the small manufacturing enterprises. Therefore, the claims in this study cannot be generalised to all small enterprises in all industries of economic activity in all parts of the world.

1.6 RATIONALE BEHIND STUDY

The motivation for carrying out this study is based on both a personal and scientific rationale. Sections 1.6.1 and 1.6.2 elaborate on the two types of rationale.

1.6.1 Personal rationale

The researcher started working at SAP Research Centre Pretoria in 2007. SAP (System Applications and Products) is a leading provider of enterprise systems and applications [SAP, 2010]. Having assisted large enterprises to manage their organisations with SAP ERP systems, the ERP system vendor is now investing in research to help small and medium businesses manage their businesses better. The idea is to utilise the same power that is characteristic of ERP systems for large enterprise [B1, 2010].

While working on various applied research projects at SAP Research Centre Pretoria, the researcher became interested in how ERP systems could be accepted in small enterprises in particular. It was discovered that this research area is of emerging and relevant interest within ERP acceptance studies. It is believed that potential exists within this research field, as the dominance of ERP systems prevails across enterprises of all sizes. The researcher would therefore like to be part of this new research movement that is exploring the potential and acceptance of enterprise systems by small enterprises. The opportunity to explore this research interest has been kindly afforded by SAP Research Centre Pretoria.

1.6.2 Scientific rationale

The acceptance of ERP systems by small enterprises is a relatively young research area. This gives rise to a number of research opportunities to close the gaps in research.

When classified, small enterprises are often grouped with medium enterprises and therefore research findings may not necessarily specifically reflect small enterprise acceptance of ERP systems [Iskanius, et al., 2009; Laforet & Tann, 2006].

There exists a shortage of industry specific literature on small and medium enterprise research [Laforet & Tann, 2006]. There is no specific focus on a particular industry, ‘most studies were done through field studies, questionnaire surveys or case studies focusing on a small sample of companies across industries – in particular, very few studies focusing on the manufacturing sector’ [Laforet & Tann, 2006, p. 367]. Research on acceptance factors is also often segmented in terms of technology acceptance factors, ERP selection and acquisition factors, ERP implementation and use

factors; it is rarely compared or integrated together in one list. It is difficult to distinguish functional and non-functional features pertaining to ERP acceptance.

The rationale for this study, therefore, is to address the concerns of researchers in the field that there is limited research that addresses small enterprises and a particular industry. This study will focus on concisely categorizing the various acceptance factors in an articulated and meaningful list.

1.7 SIGNIFICANCE AND POTENTIAL CONTRIBUTION OF THE STUDY

The focus of this study is to present a list of acceptance factors for ERP systems by small manufacturing enterprises. The findings and recommendations from this research may be useful to two key audiences. Firstly, the research findings may be useful to the community within information systems research, particularly to researchers whose area of research expertise focuses on ERP introduction, selection, acquisition, implementation, technology acceptance and technology adoption. Secondly, the findings and recommendations may be useful to ERP system vendors who wish to capture the small enterprise market. Figure 2 illustrates the contribution of this study to the information systems research discipline.

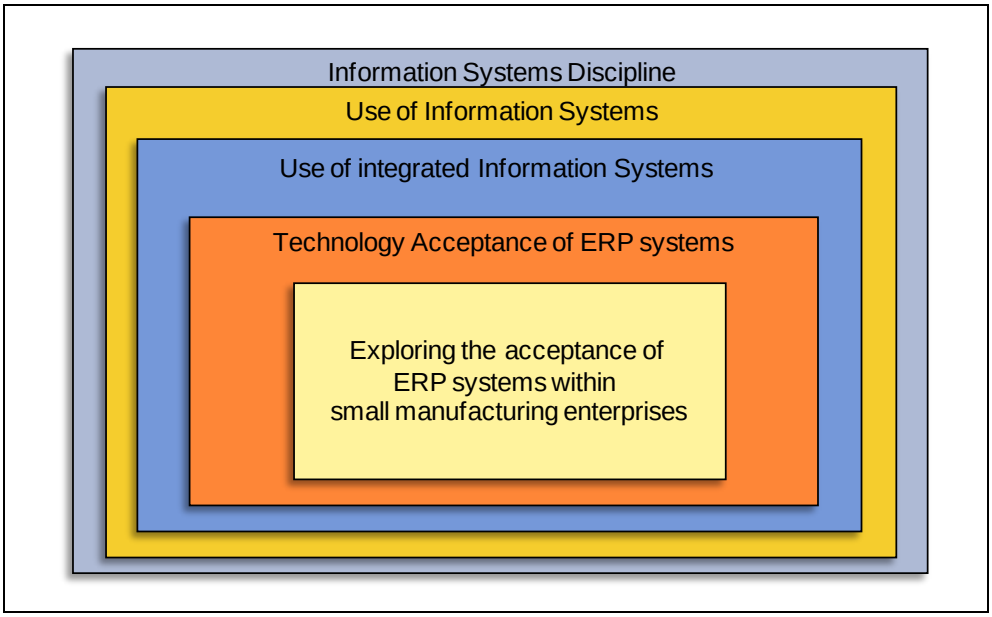


Figure 2: Contribution to Information Systems research discipline

The field of technology acceptance within information systems research may benefit from exploratory insight on the subject of acceptance of ERP systems by small manufacturing enterprises. This research is expected to stimulate further comparative studies on the acceptance and adoption of ERP systems within enterprises in other industries in developed, developing and emerging countries.

The findings of the research may motivate the need for ERP system vendors to revaluate how they approach selling ERP systems to small enterprises. The survey involves small manufacturing enterprises only; therefore, this study could be replicated in other industry case studies to gain a deeper, thorough and holistic understanding of ERP system acceptance across the small enterprise industry spectrum. This could revitalise an understanding of the small enterprise market. This new understanding could enable ERP system vendors to capture the small enterprise ERP system market.

1.8 RESEARCH APPROACH

'Research is a scientific and systematic search for pertinent information on a specific topic' [Kothari, 2005]. Research can be systematically conducted in numerous ways. The study followed an interpretivistic survey approach [Klein & Myers, 1999] in order to answer the research questions (Section 1.4). The nature of interpretivistic research aligns well with the research explored in this study. The researcher wanted to obtain multiple perspectives on the acceptance of ERP systems by small manufacturing enterprises. Questionnaires and interviews were the main data collection methods for the collection of findings from small manufacturing enterprises and ERP system consultants, respectively. An analysis and interpretation of the findings is presented in Chapter 7: Discussion of Research Findings. Although this study was mainly qualitative in nature, quantitative research was also done. It is not uncommon to adopt an integrated analysis approach, that is, using both qualitative and quantitative analysis [Oates, 2006] to provide both rich interpretation and statistical support to achieve 'novel insight' [Lee & Xia, 2010, p. 89]. The detailed research methodology is presented in Chapter 3: Research Methodology.

1.9 ETHICAL CONSIDERATIONS

All research participants were treated with respect in terms of human dignity, time, position and authority of the research participant, information provided and willingness to participate in the study [Myers & Newman, 2007]. Table 1 lists considerations that an ethical researcher should adhere to in fulfilling the research process [Oates, 2006, pp. 56-60], which was used as a guideline during this research.

Table 1: Ethical concerns [Oates, 2006]

Ethical Researcher	▪ Limit intrusion ▪ Research with integrity and honesty ▪ Follow the code of good research conduct ▪ Do not plagiarise
Informed Participants	▪ Inform participant of the right not to participate ▪ Inform participant of the right to withdraw ▪ Inform participant of the right to give informed consent ▪ Inform participant of the right to anonymity ▪ Inform participant of the right to confidentiality

The researcher did not coerce potential research participants to participate in the study, nor did the researcher divulge confidential information, as requested by the research participants. All participants signed a 'Research Participant's Permission Form', (Appendix B: Research Questionnaire and Appendix C: Research Interview), regarding research participant involvement in this study.

1.10 DISSERTATION STRUCTURE

This dissertation comprises 8 chapters. Figure 3 outlines the structure of the dissertation. At the beginning of each chapter, a dissertation map will indicate - in a bold border - the *stage in dissertation*. A *map* of the specific chapter follows the dissertation map, to outline only the main structure of that chapter.

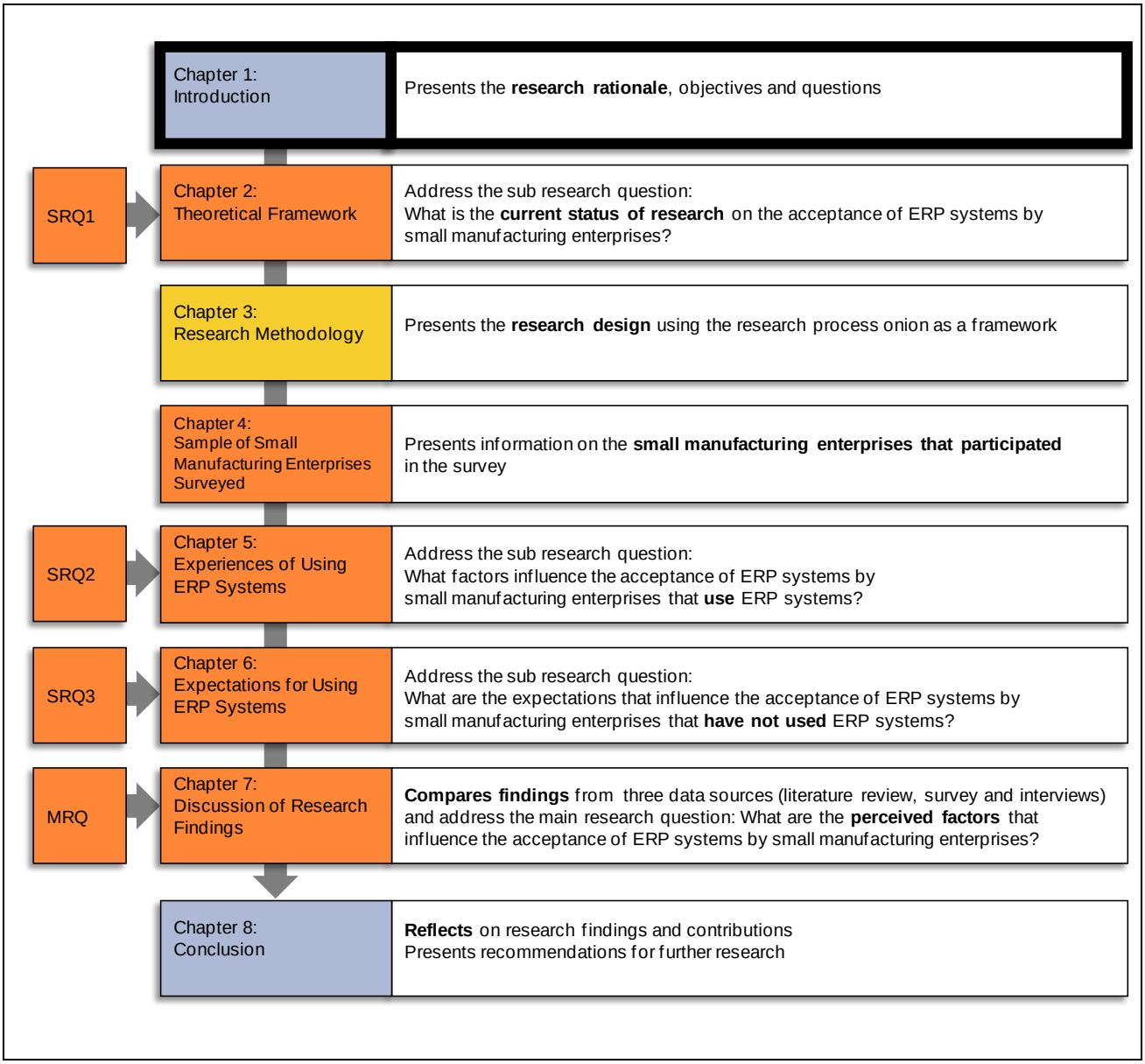
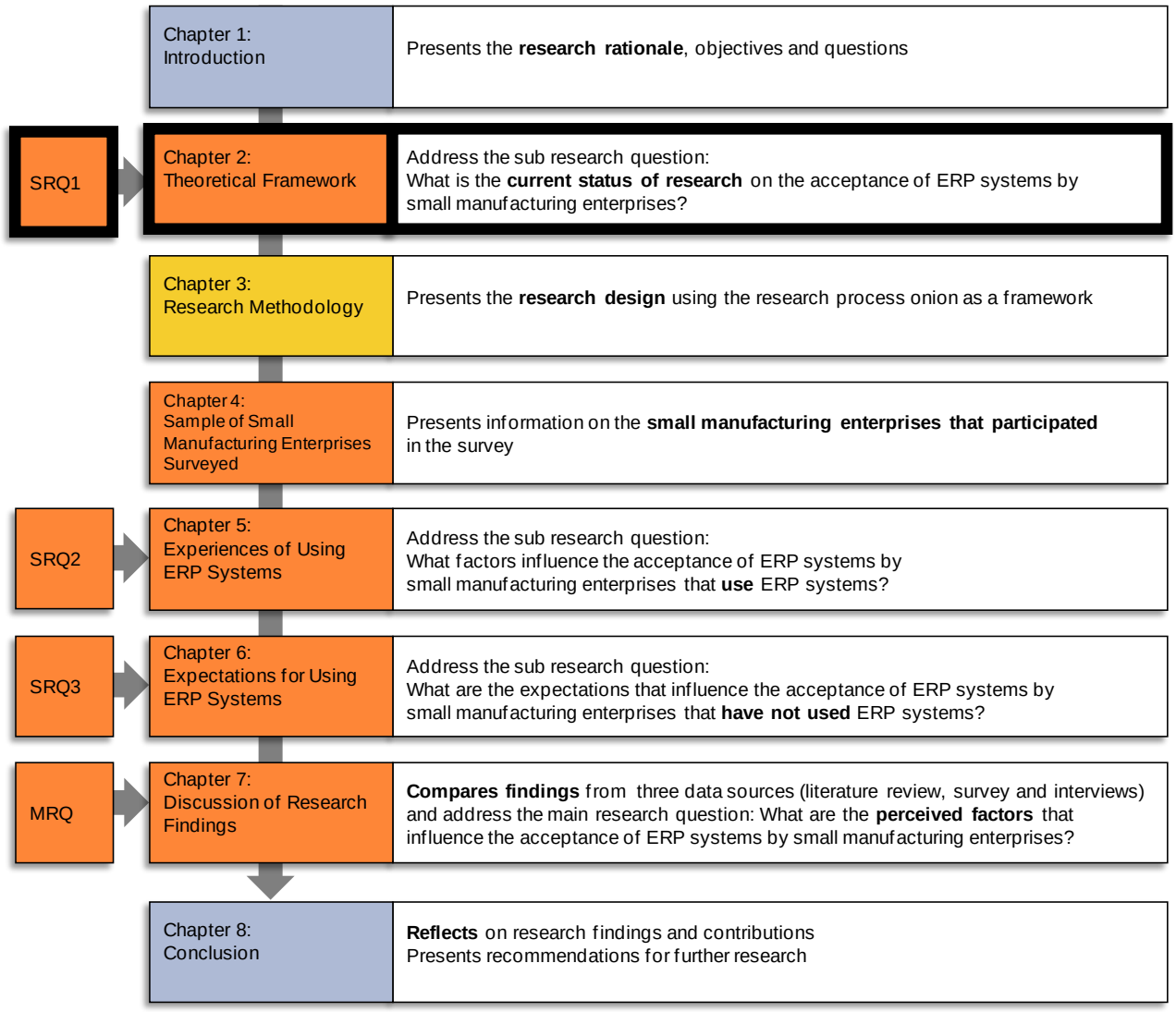


Figure 3: Dissertation structure

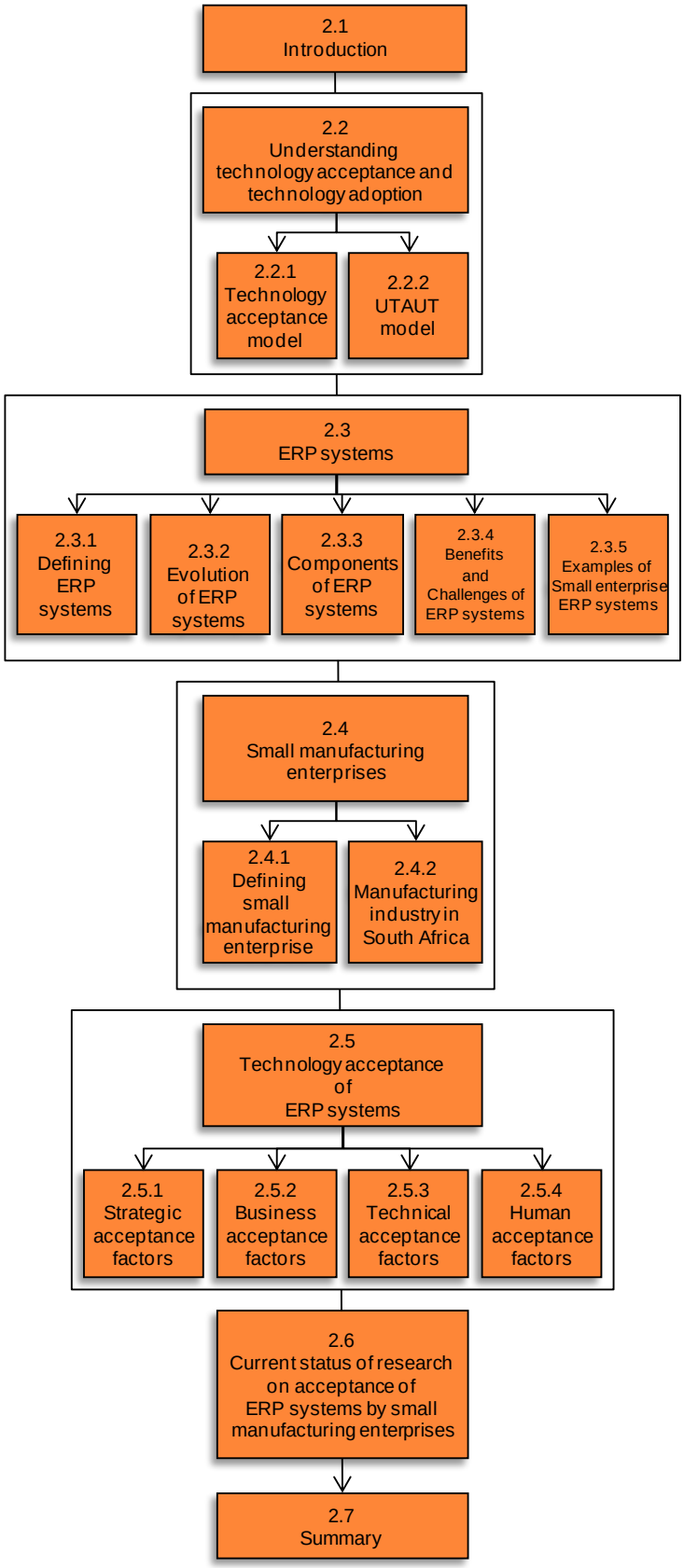
Chapter 1 is the introductory chapter that presents the research rationale. Chapter 2 addresses the first research question: What is the current status of research on the acceptance of ERP systems by small manufacturing enterprises? A discussion on the research design is presented in Chapter 3. Chapter 4 presents information on the sample of small manufacturing enterprises surveyed. Chapter 5 and Chapter 6 present findings from small manufacturing enterprises that have used ERP systems and those that have not, respectively. Chapter 7 presents a discussion of all research findings, by comparing findings collected from literature, small manufacturing enterprises and ERP system consultants. Chapter 8 concludes this dissertation by reflecting on the research findings and addressing the research questions and objective of the study. In addition, Chapter 8 proposes recommendations for further research within the small enterprise and ERP system research domain.

CHAPTER 2: THEORETICAL FRAMEWORK

Stage in Dissertation



Map of Chapter 2



2.1 INTRODUCTION

This chapter addresses SRQ1:

SRQ1: What is the current status of research on the acceptance of ERP systems by small manufacturing enterprises?

In this chapter, a review of literature that assists in addressing the research question is presented. The main focus of this study is on technology acceptance and is therefore discussed in Section 2.2. ERP systems are the primary research domain and discussed in Section 2.3. Since the purpose of this study is to understand the acceptance of ERP systems by small manufacturing enterprises, the application domain of small manufacturing enterprises is discussed in Section 2.4. The acceptance of ERP systems is presented in Section 2.5. Section 2.6 unifies the literature findings and presents answers to SRQ1. A summary highlights literature findings and research gaps identified (Section 2.7).

2.2 UNDERSTANDING TECHNOLOGY ACCEPTANCE AND TECHNOLOGY ADOPTION

Numerous studies [Chan & Teo, 2007; Davis, 1989; Davis, et al., 1989; Malhotra & Galletta, 1999; Venkatesh & Davis, 2000; Venkatesh, et al., 2003] investigated the concept of technology acceptance and technology acceptance models. The diversity within the technology acceptance field, specifically in terms of successful acceptance of information systems [Behrens, Jamiesion, Jones, & Cranston, 2005; Igbaria & Tan, 1997] makes it difficult to define and distinguish the concept of technology acceptance from adoption. According to Renaud and Van Biljon [2008, p. 211] acceptance can be seen as ‘an attitude towards a technology’; furthermore ‘it is influenced by various factors’. Acceptance is considered as a process initiated when a user of technology becomes aware of the technology and has an intention to use that technology [Renaud & Van Biljon, 2008]. Adoption stems from acceptance and results in the actual use of the technology [Oliver, 1980; Premkumar & Bhattacherjee, 2008; Rogers, 2003; Taylor & Todd, 1995]. Through the process of adoption, the user’s intention to use the technology may change and affect both the adoption and acceptance, either sustaining the adoption or adversely affecting acceptance of the technology. Thus, technology acceptance and technology adoption are closely related and are often considered as the same concept.

An interpretation of the relationship between technology acceptance and adoption is depicted in Figure 4.

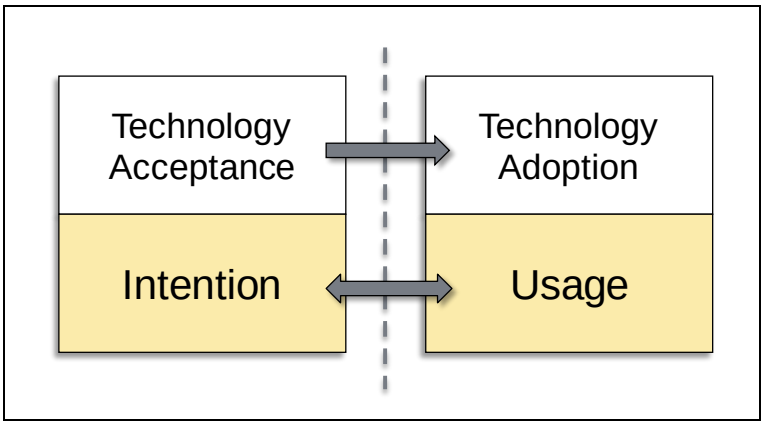


Figure 4: Technology acceptance and technology adoption

Due to the extensive literature available on technology acceptance and adoption research, it would not be feasible to provide an in-depth review of all technology acceptance and adoption concepts, theories and models. If the reader is interested in additional information, the research cited in this theoretical framework serves as an account of current and prominent research within the technology acceptance and technology adoption research field.

The focus of this research in on technology acceptance and therefore further discussion focuses on technology acceptance.

There are two technology acceptance models that are most frequently referenced and used in practice. These two acceptance model are the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The TAM (Section 2.2.1) is considered to be parsimonious in nature [Hwang, 2005] and the UTAUT (Section 2.2.2) model unifies several technology acceptance models and technology acceptance and adoption theories. These two models were selected because of their current and potential application in assessing the acceptance of ERP systems (Section 2.5).

2.2.1 Technology Acceptance Model

The foundation of technology acceptance is attributed to research by Davis [1989] and Davis, et al. [1989]. According to Davis' TAM [1989, p. 319], 'fundamental determinants of user acceptance' influence an individual user's decision to use a technology. Figure 5 illustrates the TAM [Davis, 1989; Davis, et al., 1989].

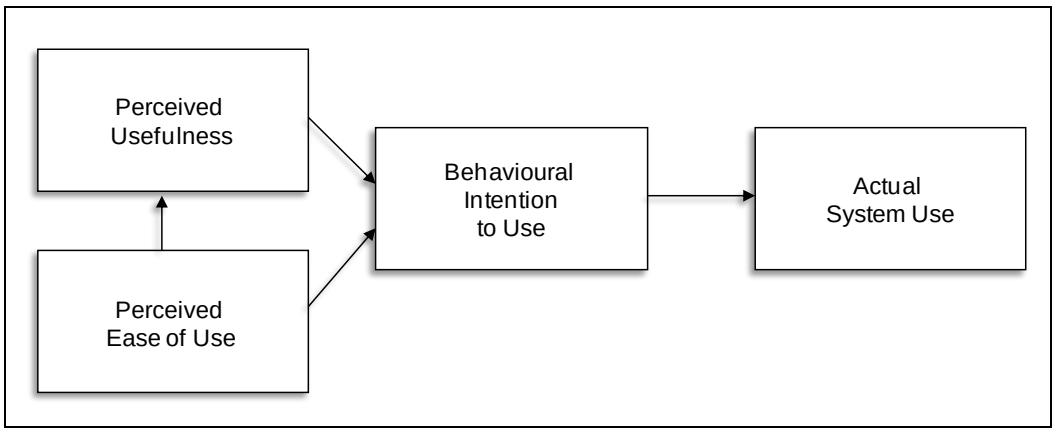


Figure 5: TAM [Davis, 1989]

The TAM states that behavioural intention to use (considered as a strong predictor of actual system use) and actual system use are influenced by two perceptions: *perceived usefulness* and *perceived ease of use*

- *Perceived usefulness* (PU) refers to 'the degree to which a person believes that using a particular system would enhance his or her job performance' [Davis, 1989, p. 320].
- *Perceived ease of use* (PEOU) refers to 'the degree to which a person believes that using a particular system would be free from effort'. This has a direct effect on perceived usefulness and technology usage [Davis, 1989, p. 320].

The use of the TAM in predicting and explaining an individual's acceptance of technology in general drew criticism [Venkatesh & Davis, 2000] as it lacks richness of generalisability in varying contexts [Legris, Ingham, & Collerette, 2003]; and specificity of a user's opinion and social influence [Malhotra & Galletta, 1999] in relation to the use of specific systems or technology. Legris, et al. [2003] and Lucas and Spitler [1999] comment that the TAM should be more inclusive of human and social change processes within business environments if it is to be continued to be used for its predicative capacity of complex information system technologies. Furthermore, Legris et al. and Lucas and Spitler suggest field studies and not just laboratory settings for testing TAM. Legris et al. [2003] cited a lack of system contextual research and call for the application of the TAM to the introduction of business process applications, not merely commercial off-the-shelf solutions and systems development applications.

The most significant model unifying individual technology acceptance models and theory is the UTAUT model [Venkatesh, et al., 2003]. Section 2.2.2 presents the UTAUT model.

2.2.2 UTAUT Model

In 2003 Venkatesh, et al. [2003] formulated the UTAUT model, as illustrated in Figure 6, which unified various technology acceptance and technology adoption theories.

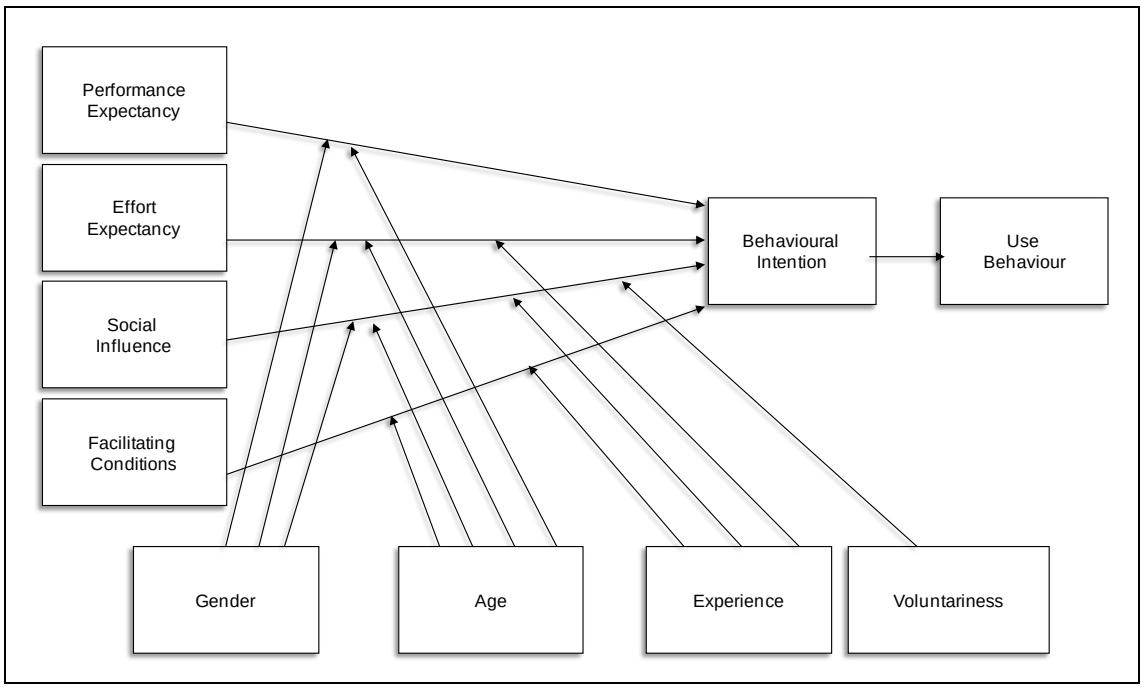


Figure 6 : UTAUT Model [Venkatesh, et al., 2003]

According to Venkatesh, et al. [2003], the model was found to outperform eight previous models, i.e.: theory of reasoned action (TRA) [Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975], theory of planned behaviour (TPB) [Ajzen, 1985], TAM, combined TPB and TAM, motivational model [Davis, Bagozzi, & Warshaw, 1992], model of personal computer utilization [Thompson, Higgins, & Howell, 1991], innovation diffusion theory [Karahanna, Straub, & Chervany, 1999], and social cognitive theory. The paper by Venkatesh, et al. provides a detailed account of the work that underpins the concept of UTAUT.

Four key determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions) influence intention of usage and behaviour. Gender, age, experience, and voluntariness influence the impact of the four key constructs on usage intention and behavior.

The four determinants that influence intention of usage and behaviour have been defined as follows [Venkatesh, et al., [2003]:

- *Performance expectancy* refers to 'the degree to which an individual believes that using the system will help him or her to attain gains in job performance' [2003, p. 447]. It is a direct

determinant of intention to use a technology and 'the strength of the relationship varies with gender and age such that it is more significant for men and younger workers' [2003, p. 467].

- *Effort expectancy* refers to 'the degree of ease associated with the use of the system' [2003, p. 450]. It was found that 'the effect of effort expectancy on intention is also moderated by gender and age such that it is more significant for women and older workers, and those effects decrease with experience' [2003, p. 467].
- *Social influence* refers to 'the degree to which an individual perceives that important others believe he or she should use the new system' [2003, p. 451]. Social influence is moderated by gender, age, experience and voluntariness factors that together influence intention to use a technology.
- *Facilitating conditions* refers to 'the degree to which an individual believes that an organisational and technical infrastructure exist to support use of the system' [2003, p. 453]. It was found that facilitating conditions are 'only significant when examined in conjunction with the moderating effects of age and experience, i.e. they only matter for older workers in later stages of experience' [2003, p. 467].

The state-of-the-art UTAUT model was designed to assist managers to proactively understand factors impacting on an individual's acceptance of new technology in an enterprise [Venkatesh, et al., 2003]. Table 2 indicates statements used in estimating the UTAUT model in terms of performance expectancy, effort expectancy, social influence and facilitating conditions.

Table 2: Statements used to estimate UTAUT model [Venkatesh, et al., 2003, p. 460]

Performance expectancy
I would find the system useful in my job.
Using the system enables me to accomplish tasks more quickly.
Using the system increases my productivity.
If I use the system, I will increase my chances of getting a raise.
Effort expectancy
My interaction with the system would be clear and understandable.
It would be easy for me to become skillful at using the system.
I would find the system easy to use.
Learning to operate the system is easy for me.
- Continued on next page -

Table 2: Statements used to estimate UTAUT model [Venkatesh, et al., 2003, p. 460] (Continued)

Social influence
People who influence my behavior think that I should use the system.
People who are important to me think that I should use the system.
The senior management of this business has been helpful in the use of the system.
In general, the organisation has supported the use of the system.
Facilitating conditions
I have the resources necessary to use the system.
I have the knowledge necessary to use the system.
The system is not compatible with other systems I use.
A specific person (or group) is available for assistance with system difficulties.

The UTAUT model is deemed to be a comprehensive model to determine acceptance of a system and was therefore considered for use in this research. A detailed discussion on ERP systems is provided in Section 2.3.

2.3 ERP SYSTEMS

The primary research domain of this study is ERP systems; hence a detailed discussion of ERP systems is presented in this section. First, definitions of ERP systems are discussed in Section 2.3.1. A discussion on the evolution of ERP systems and trends in ERP systems research follows in Section 2.3.2. The components of ERP systems are then discussed (Section 2.3.3). The benefits and challenges of using ERP systems are highlighted in Section 2.3.4. Section 2.3.5 presents examples of small enterprise ERP systems.

2.3.1 Defining ERP systems

There are a number of definitions for ERP systems [Klaus, Rosemann, & Gable, 2000]. Academics concur that it is difficult to agree on a single definition for ERP systems [Equey & Fragnière, 2008; Klaus, et al., 2000; Marnewick & Labuschagne, 2005]. Kruger [2006] believes, however, that there is a general consensus that ERP systems are the way organisations are moving towards in terms of planning for the whole enterprise.

Bagchi, et al. define ERP systems as '... a broad set of activities supported by a multi-module application software that helps an organisation manage its business, including production or service

planning, purchasing, maintaining inventories, interacting with suppliers (or customers), providing customer service, and tracking orders ’[2003, p. 142].

A similar definition by Botta-Genoulaz & Millet, considers ERP systems as ‘an integrated software package composed by a set of standard functional modules (Production, Sales, Human Resources, Finance, etc.), developed or integrated by the vendor, which can be adapted to the specific needs of each customer. It attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments’ particular needs’ [2006, p. 203].

The definition by Møller [2005, p. 484] is closely related to the definition of ERP systems by Botta-Genoulaz & Millet [2006]: ‘ERP is a standardised software package designed to integrate the internal value chain of an enterprise. An ERP system is based on an integrated database and consists of several modules aimed at specific business functions’.

An alternate but somewhat similar view of ERP systems, is that of Klaus, et al. [2000, p. 142], who view ERP systems as a commodity, emphasizing that ‘ERP can be seen as a development objective of mapping all processes and data of an enterprise into a comprehensive integrative structure’. Furthermore Klaus, et al. view ERP ‘as the key element of an infrastructure that delivers a solution to business’ [2000, p. 142].

The characteristic integration feature of ERP systems is evident in all definitions of ERP systems mentioned.

For the purpose of this study, the following definition of ERP systems is used: ERP systems are integrated, holistic, enterprise-wide business management systems that provide constant information across and within different business functions. An ERP system enables efficient and effective communication and collaboration between the enterprise and its suppliers, as well as the enterprise and its clients.

2.3.2 Evolution of ERP systems

It is important to understand the background and evolution of ERP systems within the broader enterprise applications concept, in order to understand ERP system use and future development [Robert Jacobs & Ted' Weston, 2007].

ERP systems resulted from the need in large enterprises for data and information transfer between stand-alone functional applications to become seamlessly integrated [Davenport, 1998b].

Materials resource planning (MRP) systems emerged in the 1970s in the manufacturing and construction industries as a means to calculate the optimal quantity of the correct materials required. This led to the development of second-generation materials resource planning solutions, referred to as MRP-II systems, in the 1980s. MRP-II systems provided extended calculation functionality for capacity planning, scheduling and shop floor control and other calculations. The 1990s saw MRP-II systems integrating other functional areas of business, such as finance, human resource, and project management [Klaus, et al., 2000].

A new term was required and Gartner labelled this enterprise resource planning - commonly referred to as ERP systems [Wylie, 1990]. 'The concept of ERP seems to be growing and expanding' [Moon, 2007, p. 248] also asserts that industry has accepted ERP systems as a means of achieving enterprise integration. The 2000s sees a number of trends relating to extensions and method of delivery of ERP system functionality over hosted platforms, such as the web and mobile platforms. Web-based and cloud-based ERP systems [Aalmink, Balloul, Glagau, & Gómez, 2010] are becoming increasingly popular due to the proliferation of cloud computing and e-commerce [Shehab, Sharp, Supramaniam, & Spedding, 2004].

Figure 7 is based on the above discussion; it provides a timeline indicating noteworthy milestones in the development of ERP systems.

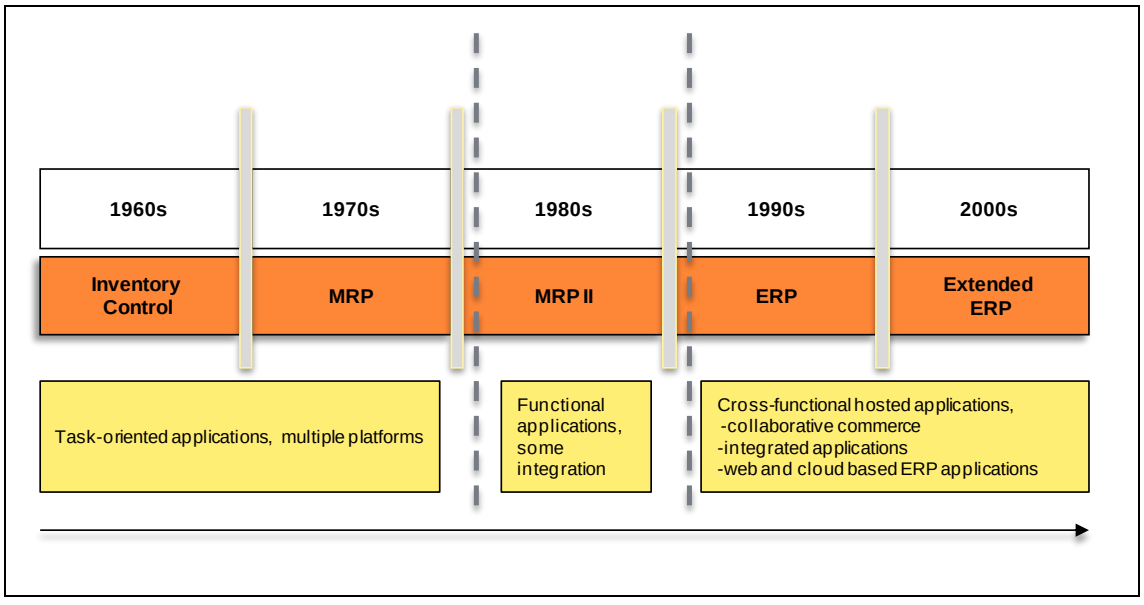


Figure 7: Milestones of ERP systems development

Botta-Genoulaz, et al.'s review of a variety of ERP system literature reveals that ERP research has been increasing steadily since the advent of the ERP concept [Botta-Genoulaz, Millet, & Grabot, 2005]. They argue that researchers who want to understand the field should focus on the most recent literature in both computing and related fields to gain a wider perspective of trends. One

trend that is emerging within the field is the use of ERP systems within the medium and even small enterprise setting [Bernroider & Koch, 2000].

The most recent review of literature within the ERP system domain was carried out by [Botta-Genoulaz, et al., 2005; Esteves & Pastor, 2001; Moon, 2007]. These literature reviews covered a number of themes relating to ERP systems.

The themes for ERP system research are discussed:

- *ERP software,* which focuses on defining ERP software and understanding the detail characterizing ERP systems. The work by Klaus, et al. [2000] questions what ERP systems are.
- *ERP selection,* which focuses on the selection and acquisition of ERP systems. A number of researchers, such as Verville, et al. [2005] and Brown, et al. [2000] conducted research that focused on ERP selection and purchasing.
- *ERP implementation* (case study, surveys, acceptance factors, change management, focused stage in the implementation process, cultural issues). This research area focuses on aspects relating to the installation of ERP systems. Change management required in preparation for using ERP systems is also researched within this theme. ERP implementation is not seen as a once-off-event, but as a complex process [Akkermans & Helden, 2002] that is challenging to manage.
- *Using ERP* systems (diffusion, decision support, focused function in ERP, maintenance, acceptance and adoption). This stream of ERP system research covers topics relating to actual use and planned use of ERP systems.
- *ERP optimisation and extension*. This research looks at ERP system enhancements and future extensions as the concept of ERP becomes intertwined with the daily operations of an enterprise [Davenport, 1998a].
- *ERP value,* which focuses on the value derived from ERP investments from a number of perspectives, including traditional methods of determining return on investment (ROI) and other cost factors [Irani, Ezingeard, & Grieve, 1997].
- *ERP trends and perspectives*, which looks at the future of ERP systems acquisition, implementation, and use. This includes ERP system delivery, such as web hosted ERP applications and integration with a wide variety of web services. An example of recent work in this areas is Garbani et al. [2009].
- *ERP education,* which focuses on how ERP system education influences the use of ERP systems. In most instances, ERP system training is required in order to make use of ERP systems. Researchers want to understand the effectiveness of training and education, and to assess if these interventions resulted in the optimal use of ERP systems. Research in this area includes

Amoako-Gyampah's [2007] work that states that training and communication is important in attaining user support in actively making use of ERP systems.

The research explored in this theoretical framework is representative of ERP research trends relating to ERP system selection, implementation, and use.

2.3.3 Components of ERP systems

Davenport's [1998b, p. 4] anatomy of an enterprise system indicates key components or applications, as well as the interaction between the different applications, as illustrated in Figure 8.

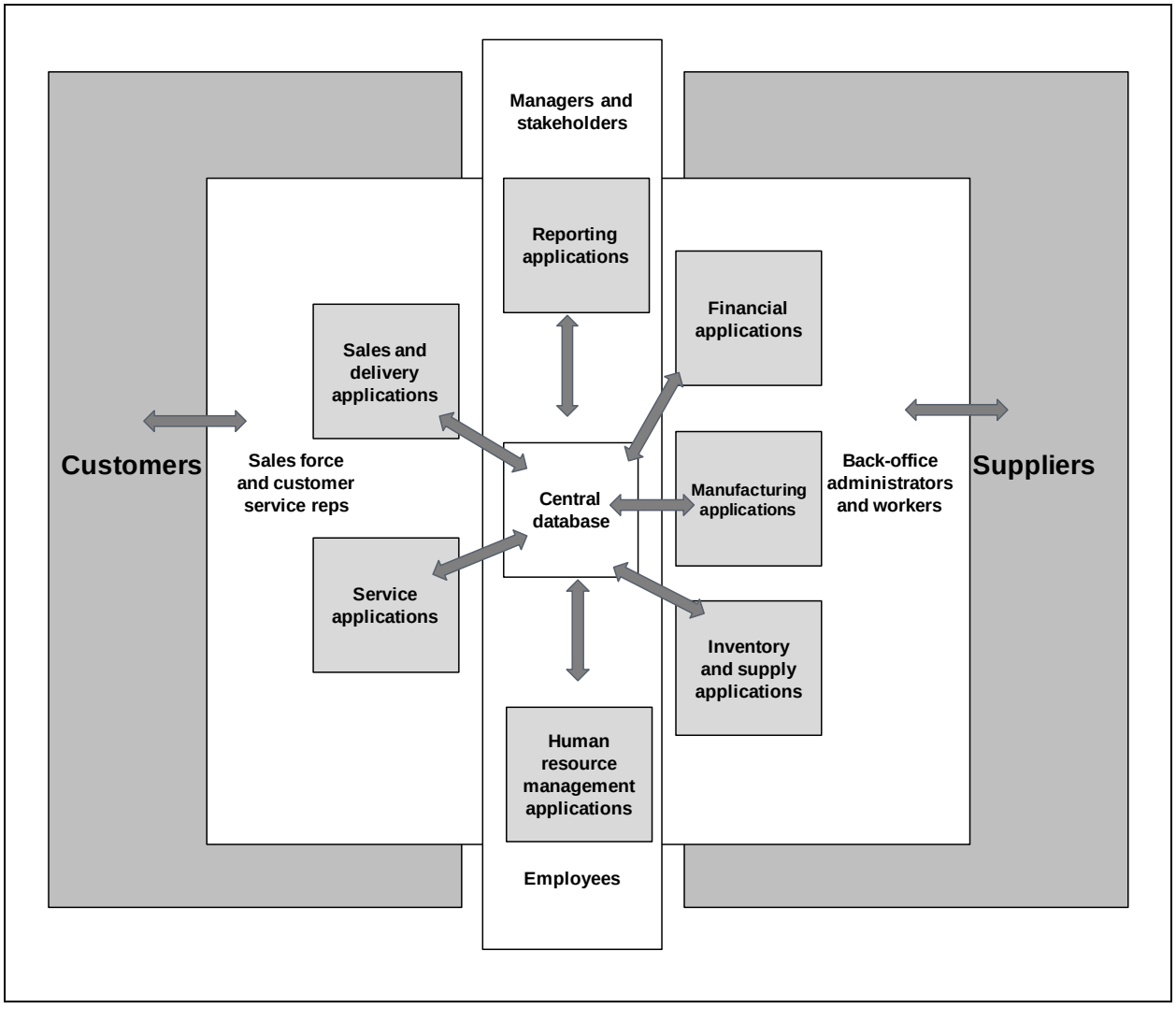


Figure 8: Anatomy of an enterprise system [Davenport, 1998b]

The functionality and components supported by an ERP system are generally designed to support 'best business practice' [SAP, 2010; Sledgianowski & Tafti, 2007, p. 423], thereby ensuring a complete solution for the enterprise that uses the ERP system. Davenport's anatomy is adapted and expanded in Figure 9 to represent components of an ERP system for manufacturing enterprises.

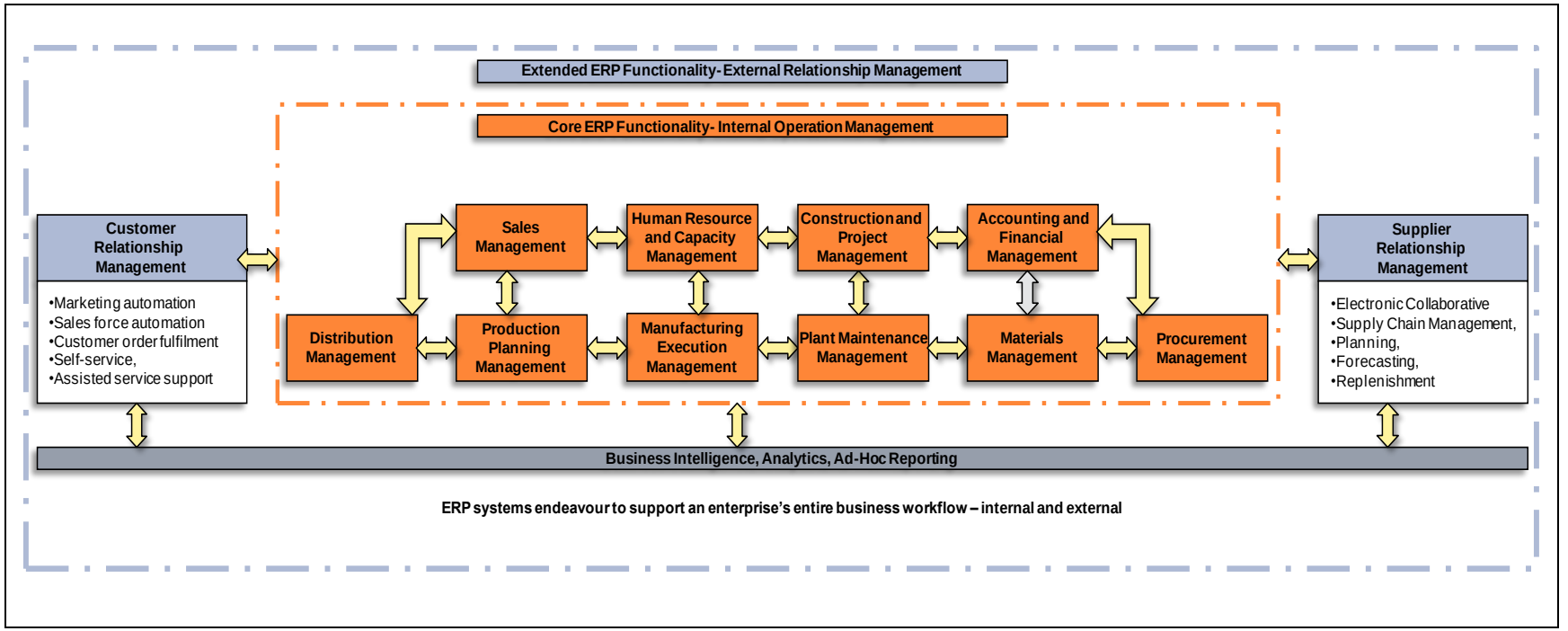


Figure 9: Components of an ERP system for a manufacturing enterprise

As Figure 9 illustrates, the following ERP system components are included in an ERP system for manufacturing enterprises:

- *Client relationship and sales management*, which focuses on maintaining client-related information, including sales order history of a particular client. This could also incorporate functional activities and services, such as marketing automation based on client relationships, sales force automation based on client relationships, customer order fulfilment, and self-service and assisted-service support to clients [Chen & Popovich, 2003; Davenport, 1998b; Møller, 2005].
- *Human resource and capacity planning*, which involves maintaining employee related information and skills management to ensure effective capacity planning [Worley, Chatha, Weston, Aguirre, & Grabot, 2005].
- *Construction and project management*, which covers functional activities relating to planning for construction and project activities within an enterprise [Draeger, 2000; Tserng, Yin, Skibniewski, & Lee, 2008].
- *Accounting and financial management*, which supports the financial aspects of an enterprise's operations [Scapens & Jazayeri, 2003; Shehab, et al., 2004]. ERP systems are traditionally renowned for their ability to allow viewing of complete financial information of an enterprise [Hofmann, 2008].
- *Manufacturing (planning, materials procurement, execution, and production) management*, which forms the core functionality of ERP systems, particularly for manufacturing enterprises [Botta-Genoulaz & Millet, 2006; Dangayach & Deshmukh, 2005; Deep, et al., 2008; Gupta, 2000; Huang, 2002; Koh & Simpson, 2005; Kruger, 2006; Loh & Koh, 2004].
- *Supplier relationship and procurement management*, which focuses on maintaining supplier related information, including procurement history with a particular supplier [Bourque, 2007; Cambra-Fierro & Polo-Redondo, 2008; Marnewick & Labuschagne, 2005; Møller, 2005]. This can also incorporate functional activities and services such as electronic collaborative supply chain management as well as planning and forecasting materials replenishment for construction, project, and operational activities of an enterprise.
- *Business intelligence, analytics and ad hoc reporting*, which supports an enterprise by providing periodic or on-demand reporting to assist in decision-making [Chou &

Tripuramallu, 2005; Elbashir, Collier, & Davern, 2008; Marnewick & Labuschagne, 2005]. Business intelligence is a category of analytic applications that are now part of the ERP system landscape to support strategic and operational activities of the enterprise [Møller, 2005].

The components of an ERP system function interdependently [Ranganathan & Brown, 2006] using data accessed from related components. The capability to integrate business functions is a central characteristic of an ERP system.

2.3.4 Benefits and challenges of using ERP systems

Researchers have documented the different tangible and intangible benefits [Bernroider & Leseure, 2005; Callaway, 1999; Esteves, 2009; Murphy, 2002; Shang & Seddon, 2002] as well as the challenges and risks [Callaway, 1999; Häkkinen & Hilmola, 2008; He, 2004; Verville, et al., 2005] that ERP systems pose to users. These benefits and challenges may influence acceptance and eventual adoption of ERP systems [Lim, Pan, & Tan, 2005] and are discussed in Section 2.3.4.1 and Section 2.3.4.2.

2.3.4.1 Benefits of using ERP systems

Bocij et al. [2008] states that ERP systems can provide end-to-end automation and integration, thereby optimising functions, processes, and workflows. ERP systems can leverage business processes and operations by facilitating improved quality of information, enterprise wide information sharing, substantial cost reductions, improved decision making, and an increase in productivity [Botta-Genoulaz & Millet, 2006; Marnewick & Labuschagne, 2005].

It is also evident that communication and collaboration within and between stakeholders, both internal and external to the enterprise, is supported through the use of ERP systems [Esteves, 2009; Leung, Choy, & Kwong, 2010].

ERP systems are designed and developed to incorporate best business practices [Lim, et al., 2005], thus enabling efficient and effective business operations. Some researchers [Elbertsen, Benders, & Nijssen, 2006; Ragowsky & Gefen, 2008] explored the benefit that industry best-of-breed ERP systems can improve an enterprise's strategic and competitive abilities.

2.3.4.2 Challenges of using ERP systems

ERP system integration and assimilation can be a complex, incompatible, and arduous undertaking, as radical business process re-engineering and hesitant changes (organisational, managerial and cultural) are likely to follow [Akkermans & Helden, 2002; Bernroider & Leseure, 2005; Lim, et al., 2005]. However, according to Bernroider and Leseure [2005, p. 11], this challenge may be experienced more by larger, established enterprises rather than small enterprises: 'smaller organisations tend to be more flexible than larger ones as their organisational structure is less rigid and can be changed more easily.'

ERP systems are seen as rigid [Olsen & Sætre, 2007], inflexible, and unable to support uncertainty [Koh & Simpson, 2005]. ERP system customisation to fulfill unique and specific needs is a challenging and costly project [Quiescenti, Bruccoleri, La Commare, La Diega, & Perrone, 2006], as ERP systems offer best practice solutions that may not necessarily align to the operations of the adopting enterprise [Kwahk & Ahn, 2010]. Laukkanen et al. [2007] emphasize that customisation also takes time and impacts on future upgrades [Ziaee, et al., 2006] of ERP systems. Therefore, ERP system customisation presents a dilemma.

The question of adaptation to what is offered by an ERP system or development of an in-house [Olsen & Sætre, 2007] system to fulfill requirements [Huang & Palvia, 2001] poses a difficult decision for the enterprise acquiring and implementing an ERP system. ERP is a long-haul investment. It is difficult to realise the return on investment [Bernroider & Koch, 2000; Davenport, 2000; Ravarini, Tagliavini, Pigni, & Sciuto, 2000]. Implementation, maintenance, technical, and user support costs can make ERP systems costly [Irani, et al., 1997]. Elbertsen et al. [2006, p. 813] concisely describe the challenges posed to small enterprises by costs associated with an ERP system: 'High start up fees and fees for annual maintenance may reduce the propensity to adopt the technology.'

Nevertheless, Equey and Fragnière [2008] state that the benefits of implementing an ERP system far outweigh the challenges of ERP system implementation and use. Marnewick & Labuschagne [2005] similarly concur that the expectation of the benefits of using an ERP system is important in defining the purpose of the ERP system.

2.3.5 Examples of small enterprise ERP systems

It is commonly accepted that small enterprises are categorised with medium enterprises, with these enterprises being referred to collectively as SMEs or small and medium enterprises. It was found that, at the time of carrying out this research, ERP systems were developed for SMEs and not necessarily developed for small enterprises in particular. Some ERP system vendors are realising that there are subtle and unique differences between small and medium enterprises [Laukkanen, et al., 2007] and now offer ERP systems to suit small enterprise needs [Robert Jacobs & Ted' Weston, 2007].

Examples of small and medium enterprise ERP systems include:

- *Compiere*, which is an open source and 'cloud-based ERP solution' that claims to provide 'improved scalability, usability, and enhancements to manufacturing.' The company, by the same name of the ERP system, continues to conduct research and fund development initiatives to develop the 'most comprehensive, flexible and economical ERP solution on the market today' [Compiere, 2010]. ERP system functionality includes manufacturing, warehouse, purchasing, materials, order and global finance management. The customer relationship management functionality includes sales, web store, and service and customer history management.
- *Microsoft Dynamics* solutions is aimed at the manufacturing industry and enables communication and collaboration, supports customer service, assists with quoting and estimations and supports production planning, and project management [Dynamics, 2010]. Some of the functionality provided includes: customer and supplier relationship management, human resource management, project management and financial management.
- *Openbravo*, which is a web-based open source ERP system that professes to provide a 'rich functional footprint' that supports 'integrated accounting, sales & CRM (customer relationship management), procurement, inventory, production, and project & service management' within an 'integrated ecosystem of add-ons' that can 'scale with ease.' [OpenBravo, 2010].
- *InfoR ERP solutions* offer 'scalable ERP solutions' that are 'business-specific solutions with industry experience built in' [InfoR, 2010]. The ERP solutions accommodate service management, lean manufacturing, process manufacturing, quality management, financial management, and wholesale and distribution management, depending on the type of manufacturing sector.

- *Sage Accpac ERP solutions* claim to assist small and medium enterprises to manage 'their accounting, operations, and customer relationships' [Accpac, 2010].
- *SAP Business One* is an example of a small and medium enterprise ERP system that offers a packaged solution, inclusive of the following business functionality: financials, sales, customer relationship management, and inventory and operations management. This ERP system is said to be 'a single application, eliminating the need for separate installations and complex integration of multiple modules' [B1, 2010].
- *SYSPRO* offers an integrated solution that supports planning and management 'of all facets of business, including accounting, manufacturing, and distribution operations in a variety of industries' [SYSPRO, 2010].

Other solutions catering to the small and medium enterprise market is predominately financials solutions with some integration of payroll, customer and supplier relationship, and business planning functionality. These systems include Softline Pastel's Beyond Accounting solutions [Softline, 2009] and QuickBooks' Financial Solutions [QuickBooks, 2009].

Most small and medium enterprises first make use of transaction processing, accounting, and payroll applications. However, small and medium enterprises realise that these stand alone systems no longer meet their growing organisational needs [Tagliavini, Faverio, Ravarini, Pigni, & Buonanno, 2002]. The ability to view the integrated and whole enterprise leads enterprises to investigate what integrated applications are available to meet their specific business requirements [Olsen & Sætre, 2007].

2.4 SMALL MANUFACTURING ENTERPRISES

Section 2.4.1 presents definitions of small enterprises and small manufacturing enterprises. Everdingen, et al. [2000] state that there is limited research relating to ERP acceptance and adoption by small and medium enterprises. Laforet and Tann [2006] emphasize that there is a lack of industry specific literature and Iskanius, et al. [2009] concur that there is still a lack of research on ERP acceptance by small enterprises. It is due to the nature of the manufacturing industry that it was decided to focus on this specific industry. A discussion on the manufacturing industry is presented in Section 2.4.2.

2.4.1 Defining small manufacturing enterprises

The type of industry, number of full-time equivalent of paid employees, total annual turnover, total gross asset value (fixed property excluded) and annual balance sheet are just some of the common perimeters used to define the type of enterprise. The European Union [EU] distinctly defines an enterprise as:

'… any entity engaged in an economic activity, irrespective of its legal form. This includes, in particular, self-employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity' EU [2003, p. 39].

The EU defines *small and medium-sized enterprises* as enterprises that 'employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million' [EU, 2003, p. 39].

Furthermore, the EU define a *small enterprise* as 'an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million'[2003, p. 39].

A more formal understanding of small enterprises is presented in the National Small Business Amendment Act, 2004, [SA, 2004, p. 2], in which the South African government defines *small enterprises* as:

'a separate and distinct business entity, together with its branches or subsidiaries, if any, including co-operative enterprises and non-governmental organisations, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or subsector of the economy mentioned in column 1 of the Schedule and which can be classified as a micro-, a very small, a small or a medium enterprise by satisfying the factors mentioned in columns 3, 4 and 5 of the Schedule'.

Table 3 presents an excerpt of the classification of medium, small, very small and micro enterprises as found in the National Small Business Amendment Act, 2003 Schedule [SA, 2003, p. 5]

Table 3: Medium, small, very small and micro manufacturing enterprises [SA, 2003, p. 5]

'SCHEDULE'				
Column 1	Column 2	Column 3	Column 4	Column 5
Sector or subsector in accordance with the Standard Industrial Classification	**Size of class**	**The total full-time eqivalent of paid employees**	**Total turn-over**	**Total gross asset value (Fixed property excluded)**
Manufacturing	Medium	200	R 51 million	R 19 million
	Small	50	R 13 million	R 5 million
	Very small	20	R 5 million	R 2 million
	Micro	5	R 0,20 million	R0,10 million

2.4.2 Manufacturing industry in South Africa

According to a report by Statistics South Africa [2008], the manufacturing industry is considered one of South Africa's most prolific industries, contributing a total income of R1 526 502 million to national income in 2008. Many governments, including the South African government, encourage the development of a diverse and resilient manufacturing industry, which can compete within the global community. In one of the few academic works that explore the manufacturing industry in South Africa, Tregenna [2008] (*The contributions of manufacturing and services to employment creation and growth in South Africa),* emphasizes that the manufacturing industry enables sustainability and contributes to employment creation and the structuring of both government policy and corporate strategy.

2.4.2.1 Challenges of the manufacturing industry

Bourque [2007] points out that the manufacturing industry, which is a secondary industry, faces numerous challenges. One such concern is that many products are manufactured in environments where supplies are sourced from different locations, both within and outside the borders of the country of operation. An intricate network of relationships between suppliers, manufacturers and distributors needs to be managed. Many enterprises are confronted with the challenge of tracking procurement and production costs and, therefore, how to manage these varying costs. The ever changing demands of clients also means that manufacturing enterprises need to be agile in order to meet these demands in terms of right quantity, quality, time and cost [Kettunen, 2008]. It is believed that these challenges can be addressed through novel systems, such as ERP systems [Bourque, 2007].

2.4.2.2 Classification of the South African manufacturing industry

For purposes of this research, a classification of manufacturing sectors will assist in determining in which manufacturing sector the small manufacturing enterprises operate. The South African manufacturing industry is classified according to the Standard Industrial Classification (SIC) of all industrial activities, as defined by Statistics South Africa [2000]. Table 4 lists the classification codes of the main categories of manufacturing sectors and sector specific classification codes are omitted.

Table 4: Standard Industrial Classification of the manufacturing industry [STATISTICS, 2000]

SIC	**Manufacturing sectors**
30000	Manufacture of Food Products, Beverages and Tobacco Products
31000	Manufacture of Textiles, Clothing and Leather
32000	Manufacture of Wood and Products of Wood and Cork, except Furniture
	Manufacture of Articles of Straw and Plaiting Materials
	Manufacture of Paper & Paper Products
	Manufacture of Publishing, Printing and Reproduction of Recorded Material

- Continued on next page -

Table 4: Standard Industrial Classification of the manufacturing industry [STATISTICS, 2000] (Continued)

33000	Manufacture of Refined Petroleum, Coke and Nuclear Fuel
	Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals)
	Manufacture of Rubber and Plastic Products
34000	Manufacture of Non-Metallic Mineral Products
35000	Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment
	Manufacture of Office, Accounting and Computing Machinery
36000	Manufacture of Electrical Machinery and Apparatus (n.e.c)
37000	Manufacture of Radio, Television and Communication Equipment and Apparatus
	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks
38000	Manufacture of Transport Equipment
39000	Manufacture of Furniture
	Manufacturing n.e.c
	Recycling

2.5 TECHNOLOGY ACCEPTANCE OF ERP SYSTEMS

In terms of assessing the acceptance of ERP systems, Hwang [2005, p. 155] gives reasons for the lack of TAM (Section 2.2.1) literature within the ERP system context: '… application of TAM to enterprise systems implementation is *complex*, since enterprise systems *need organisational viewpoint as well as individual perspective*.' Hwang asserts that a more conclusive comprehension of an ERP system is required within the organisational context.

Seven notable studies explored the area of applying the TAM to evaluate ERP system acceptance, namely:

- Amoako-Gyampah & Salam's [2004] study entitled: 'An extension of the technology acceptance model in an ERP implementation environment'.
- Bueno & Salmeron's [2008] study entitled: 'TAM-based success modeling in ERP'.
- Calisir & Calisir's [2004] study entitled: 'The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resource planning (ERP) systems'.
- Gefen's [2004] study entitled: 'What makes an ERP implementation relationship worthwhile: linking trust mechanisms and ERP usefulness'.
- Hwang's [2005] study entitled: 'Investigating enterprise systems adoption: uncertainty avoidance, intrinsic motivation, and the technology acceptance model'.
- Scott's [2008] study entitled: 'Technology acceptance and ERP documentation usability'.
- Scott and Walczak's [2009] study entitled: 'Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance'.

In terms of timing, three of these studies were published in 2004; one study was published in 2005; two studies were published in 2008; and the most recent study was conducted in 2009. In general, these studies support the use of the TAM with varying outcomes in the significance of direct and indirect determinants of technology acceptance. No literature was found that specifically focuses on the application, modification and extension of the TAM to ERP system acceptance within the small enterprise setting.

A discussion of each of the seven studies mentioned follows.

- One of the first studies in response to Legris, et al.'s [2003] call for more research on the application of TAM in a business process application context, and the most cited study to apply the TAM to ERP systems, is that done by Amoako-Gyampah and Salam [2004] study. The study investigated an extension of the TAM in an ERP system implementation environment within a large enterprise. The researchers, however, caution against generalisation of the study's findings to other contexts. Amoako-Gyampah and Salam [2004] extended the TAM by including a user's belief constructs and shared belief constructs (organisational group) as well as training and project communication as external variable determinants of ERP acceptance. The importance of training and communication in ERP implementation supports the use of ERP systems.

- The study done by Calisir & Calisir [2004] explored a conceptual model of using interface usability characteristics (system capability, user guidance and learnability) with perceived usefulness and perceived ease of use as determinants to predict end-user satisfaction with using ERP systems. The findings support the conceptual model based on the TAM. Perceived usefulness was found to be a significant determinant of end-user satisfaction. It was also found that users who perceived ERP systems to be difficult to use (perceived ease of use) were less likely to make use of ERP systems. The researchers confirmed that the user interface of an ERP system must support intuitive learning, perceived system capabilities, and expectations. The use of navigation aids that are perceived as easy to understand may encourage users to make use of the ERP system. A recommendation for ERP systems to be 'both useful and easy to use systems' [2004, p. 511] is made. The researchers also suggested application of the findings to specific industries and across a multitude of users from different backgrounds in order to refine the findings of the study.
- The exploratory study by Gefen [2004] dealt with the concept of building trust in business transactions. It was found that a client's perception of usefulness and assessment of the qualities of the ERP system can contribute to the client's assessment of the relationship with the ERP system. If the perception of usefulness of the ERP system is met, this would render the client-ERP relationship worthwhile and lead to ERP system use. Furthermore, the study found that perceived ease of use of the ERP system could influence ERP system usefulness and use positively. This finding supports findings of Calisir & Calisir's [2004] study on perceived ease of use of ERP systems.
- Hwang's [2005] study focused on ERP system adoption using an extended TAM model that incorporated informal control, an individual cultural dimension and intrinsic motivation. The findings resulted in an understanding of the relationships between the various acceptance constructs and original TAM variables. Furthermore, although the TAM is supported by Hwang in the study, a finding indicates that the TAM does not support 'the relationship between ease of use and usefulness when the model was connected to the cultural and enjoyment factors' [Hwang, 2005, p. 158]. As expressed by Hwang 'enjoyment is a stronger predictor of usefulness than ease of use is' [2005, p. 158].
- The study by Bueno and Salmeron [2008] investigated a new model using the TAM as a basis for testing five critical success factors, comprising: top management support, communications, cooperation, training and technological complexity. The findings support the use of the TAM in determining ERP system acceptance in conjunction with the mentioned critical success

factors. The researchers conducted this research from the perspective of intention to use an ERP system, that is, a positive potential introduction of an ERP system. A proposal for future research to be conducted on ERP acceptance post-ERP system implementation is made [Bueno & Salmeron, 2008]. The view by Bueno and Salmeron [2008] is similar to Igbaria and Tan's [1997] stance that system usage is an important determinant of system acceptance.

- Technology acceptance and ERP documentation usability is explored in Scott's [2008] study. Scott found that there was no research in this area, which provided the motivation to conduct the research. The study proposed a model combining the TAM determinant of acceptance with perceived usability of ERP system documentation. The significant finding of this study is that perceived usefulness of ERP system documentation strongly influences the perceived usability of the ERP system documentation. The results support and extend the TAM in the ERP system context. If users find it useful to consult the ERP system documents, this will support 'training effectiveness, user satisfaction, productivity and the potential return on ERP investment, as well as decrease the pain and cost of implementation' [2008, p. 124].
- Finally, an empirical study that applied aspects of the TAM in a multimedia ERP system training tool was done by Scott and Walczak [2009]. The impact of user engagement and computer self-efficacy elements with user acceptance was investigated. The researchers extended the TAM research to include elements of cognitive engagement, prior experience, computer anxiety, and organisational support. It was found that TAM and computer self efficacy support the outcomes of the research conducted. Scott and Walczak [2009] recommended that appropriate training be given to appropriate users to ensure effectiveness of use of ERP systems.

A study by Riemenschneider, et al. [2003], which focused on information technology decisions taken by small businesses, found that a 'collected' model that represents the constructs of both the TPB and the TAM provided a better fit than either model alone. This implies that a single model may not yield conclusive findings on acceptance, compared to combined models, such as the UTAUT model.

No literature was found on applying the UTAUT model to assess the intention to use and the acceptance of ERP systems within a small enterprise environment.

Xiaoping and Jing [2008] recommend further research that focuses on the application of UTAUT to assess small enterprise acceptance of technology. Xiaoping and Jing argue that small businesses are predominantly individualistic with 'highly centralized … structures' [2008, p. 326]. The researchers affirm that more research is required to test 'the individual adoption in the small business environment' [Xiaoping & Jing, 2008, p. 326].

In addition to detailing UTAUT acceptance factors (Section 2.2.2), Sections 2.5.1, 2.5.2, 2.5.3, and 2.5.4 respectively summarise strategic, business, technical, and human acceptance factors, that influence ERP system acceptance. The ERP system acceptance factors, as listed in Tables 5 to 8, will be assessed to determine the applicability of ERP system acceptance factors by small manufacturing enterprises. These factors were sourced and cited from literature that focuses on ERP system selection, implementation and acceptance factors in large, medium, and small enterprises. References to literature cited are provided in the tables that list the acceptance factors.

A discussion on each of the categories of ERP system acceptance factors is presented in Section 2.5.1 to Section 2.5.4. It must be noted that although there are a number of categories that could be used, this study distinguishes ERP acceptance factors in the following four categories: strategic, business, technical, and human. The reason for this is that all of the ERP selection, implementation and related acceptance factors that were sourced from literature could be categorised into one of the four defined categories.

2.5.1 Strategic acceptance factors

Strategic acceptance factors refers to how an ERP system should promote and fit into an enterprise's long term vision, goals, and business plans [Brown, et al., 2000] in order to achieve enhanced decision-making [Poba-Nzaou, Raymond, & Fabi, 2008] and sustainability of the enterprise. Table 5 summarises identified strategic acceptance factors that influence ERP system acceptance.

Table 5: Strategic acceptance factors

	Factors	**Literature**
1	Competition in industry	[Koh & Simpson, 2007]
2	Industry necessitates the use of an ERP system	[Muscatello, et al., 2003]
3	Manage complexity and cost efficiently adapt to changes	[Tagliavini, et al., 2002]
4	Enable business growth and strategic alignment	[Poba-Nzaou, et al., 2008]
5	Better business planning and consolidation	[Iskanius, et al., 2009; Marnewick & Labuschagne, 2005]
6	Improve stakeholder relationship and trust	[Esteves, 2009; Iskanius, et al., 2009; Raymond & Uwizeyemungu, 2007]
7	Long term investment sustainability	[Davenport, 2000; Häkkinen & Hilmola, 2008]
8	Intelligent aware to alert to market force changes	[Robert Jacobs & Ted' Weston, 2007]

The strategic acceptance factors listed in the different resources range from aspects relating to industry use of ERP systems, the enablement and management of business growth, and complexity to long term investment sustainability.

2.5.2 Business acceptance factors

Business acceptance factors relate to how an ERP system can be used to manage the day-to-day operations of the enterprises and how an ERP system can support business processes [Wei & Wang, 2004] ERP systems should, ideally, support operational efficiencies within an enterprise [Shang & Seddon, 2002]. Table 6 summarises identified business acceptance factors that influence ERP system acceptance.

Table 6: Business acceptance factors

	Factors	Literature
1	Advance business operations	[Marnewick & Labuschagne, 2005]
2	Follow industry best practice	[Somers & Nelson, 2003]
3	Promote transparent governance and improve operational efficiency	[Chou & Tripuramallu, 2005; Häkkinen & Hilmola, 2008; Lim, et al., 2005]
4	Manage cash, liquidity and financial risk better	[Klaus, et al., 2000]
5	Manage the workforce through rapid change	[Amoako-Gyampah & Salam, 2004; Davenport, 1998a]
6	Low total cost of ownership – maintenance, upgrades, consultation, training, etc	[Ngai, Law, & Wat, 2008; Sledgianowski & Tafti, 2007]
7	Cost saving through optimisation of IT (information technology)	[Ziaee, et al., 2006]
8	Timely analytical-supported decision-making ability	[Loh & Koh, 2004]

The business acceptance factors listed by different resources range from aspects relating to advancing business operations, to improving operational efficiencies, to following best business practices, to cost savings, and analytically-aided decision making.

2.5.3 Technical acceptance factors

Technical acceptance factors refer to how ERP systems are understood to operate in terms of integration and expected performance. Table 7 summarises identified technical acceptance factors that influence ERP system acceptance.

Table 7: Technical acceptance factors

	Factors	Literature
1	*Provision of functionality on-demand with the ability to "switch on and switch off" functionality	[Dreiling, Rosemann, Aalst, Sadiq, & Khan, 2005] *Although this acceptance factor is not mentioned in ERP system selection, implementation or acceptance factors, the researcher found this to be an interesting factor that will be assessed within the group of technical acceptance factors.
2	Integration with other business systems	[Bernroider & Leseure, 2005; Elbertsen, et al., 2006]
3	Accessibility: anytime, anywhere, including mobile and web accessibility	[Equey & Fragnière, 2008; Hofmann, 2008; Yang, Wu, & Tsai, 2007]
4	Quick implementation time	[Buonanno, et al., 2005; Markus & Tanis, 2000; Tagliavini, et al., 2002]

The technical acceptance factors listed in the different sources range from aspects relating to the provision of business functionality, to integration of business functionality, access to business functionality and timely implementation periods.

2.5.4 Human acceptance factors

Human acceptance factors refer to non-functional aspects of ERP systems that are important factors that impact on end-user satisfaction with using ERP systems. User experience [Soh, Kien, & Tay-Yap, 2000] and training [Amoako-Gyampah & Salam, 2004] are two important human acceptance factors identified in literature. Table 8 summarises the identified user experience and training human acceptance factors that influence ERP system acceptance.

Table 8: Human acceptance factors

	Factors	Literature
1	User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done	[Calisir & Calisir, 2004; Markus & Tanis, 2000; Marnewick & Labuschagne, 2005; Scott & Walczak, 2009]
2	"Start and go" self-learning – minimal training costs	[Al-Mashari, et al., 2003; Scott, 2008]

As mentioned, there is a common tendency to group small and medium enterprises together in a homogenous group, even though these enterprises have different characteristics and unique requirements [Iskanius, et al., 2009]. Enterprise size does affect ERP adoption [Bernroider & Koch, 2000; Laukkanen, et al., 2007] and, by implication, acceptance. Section 2.4 discusses small manufacturing enterprises and Section 2.6 addresses the current status of acceptance of ERP systems by small manufacturing enterprises.

2.6 CURRENT STATUS OF RESEARCH ON ACCEPTANCE OF ERP SYSTEMS BY SMALL MANUFACTURING ENTERPRISES

The use of ERP systems has changed significantly over the past few years to include any type of company, regardless of size, industry, turnover or location. The prevalence of ERP system use by small enterprises can be attributed to a number of factors [Botta-Genoulaz, et al., 2005; Buonanno, et al., 2005; Laukkanen, et al., 2007].

One factor that influences ERP system use in small enterprises is ERP system saturation within the large enterprise market, thus spurring a campaign by ERP system vendors to encourage small enterprises to use ERP systems [Deep, et al., 2008; Huang & Palvia, 2001; Laukkanen, et al., 2007]. The desire to have a competitive edge is seen as an attractive offer for small enterprises to make use of ERP systems [Esteves, 2009; Huang & Palvia, 2001; Koh & Simpson, 2007]. System integration with large enterprises to leverage value added service provision and improve supply chain relations is another reason for ERP system use by small enterprises [Loh & Koh,

2004]. Over time, small enterprises outgrow a purely financial system and realise that integration with disparate systems poses a major challenge [Mathrani, Rashid, & Viehland, 2009].

Limited research can be found on ERP system acceptance that focuses specifically on small enterprises and small manufacturing enterprises [Laforet & Tann, 2006]. The work by Iskanius et al. [2009] is a recent example of small enterprise ERP system research. The paper by Iskanius et al. [2009] explores the experience of ERP system use in small enterprises. The perception and motivations for use of ERP systems by small enterprises resulted in findings supporting small enterprises motivation 'to improve planning procedures and customer-specific flexibility' [2009, p. 9]. Additionally, it was found that ERP systems in small enterprises (and small manufacturing enterprises) are still relatively less utilised compared to use of ERP systems by large enterprises. Iskanius et al. [2009] concur with the findings of [Koh & Simpson, 2005] that a lack of knowledge could be attributed to the lack of ERP system use within this category of enterprise. This lack of knowledge is also noted in works that investigate information system motivators and inhibitors in small enterprises [Cragg & King, 1993; Riemenschneider, et al., 2003; Xiaoping & Jing, 2008].

Because of the limited literature findings, very little information is available on the current status of acceptance of ERP systems by small manufacturing enterprises, which motivates the necessity for this research.

2.7 SUMMARY

This chapter addressed SRQ1: What is the current status of research on the acceptance of ERP systems by small manufacturing enterprises?

A distinction was made between technology acceptance and adoption. To reiterate, the focus of this study is principally on assessing acceptance. Small manufacturing enterprises that intend to make use of ERP systems and small manufacturing enterprises that have experience in using ERP systems will be assessed. It may appear that small manufacturing enterprises that have experience in using ERP systems may be adopters. However, ERP systems may not necessarily be accepted by users and lead to limited use and non-use of the technology. It is the acceptance of ERP systems that is of interest in this study.

A lack of literature relating to the acceptance of ERP systems by small manufacturing enterprises is evident. There is a scarcity of research exploring the acceptance of ERP systems by small manufacturing enterprises applying the UTAUT model in conjunction with additional ERP system specific acceptance factors. The research reviewed takes into account either traditional determinants of technology acceptance (perceived ease of use and perceived usefulness) from the TAM, or critical success factors for ERP selection and implementation (from large, medium and small enterprise literature).

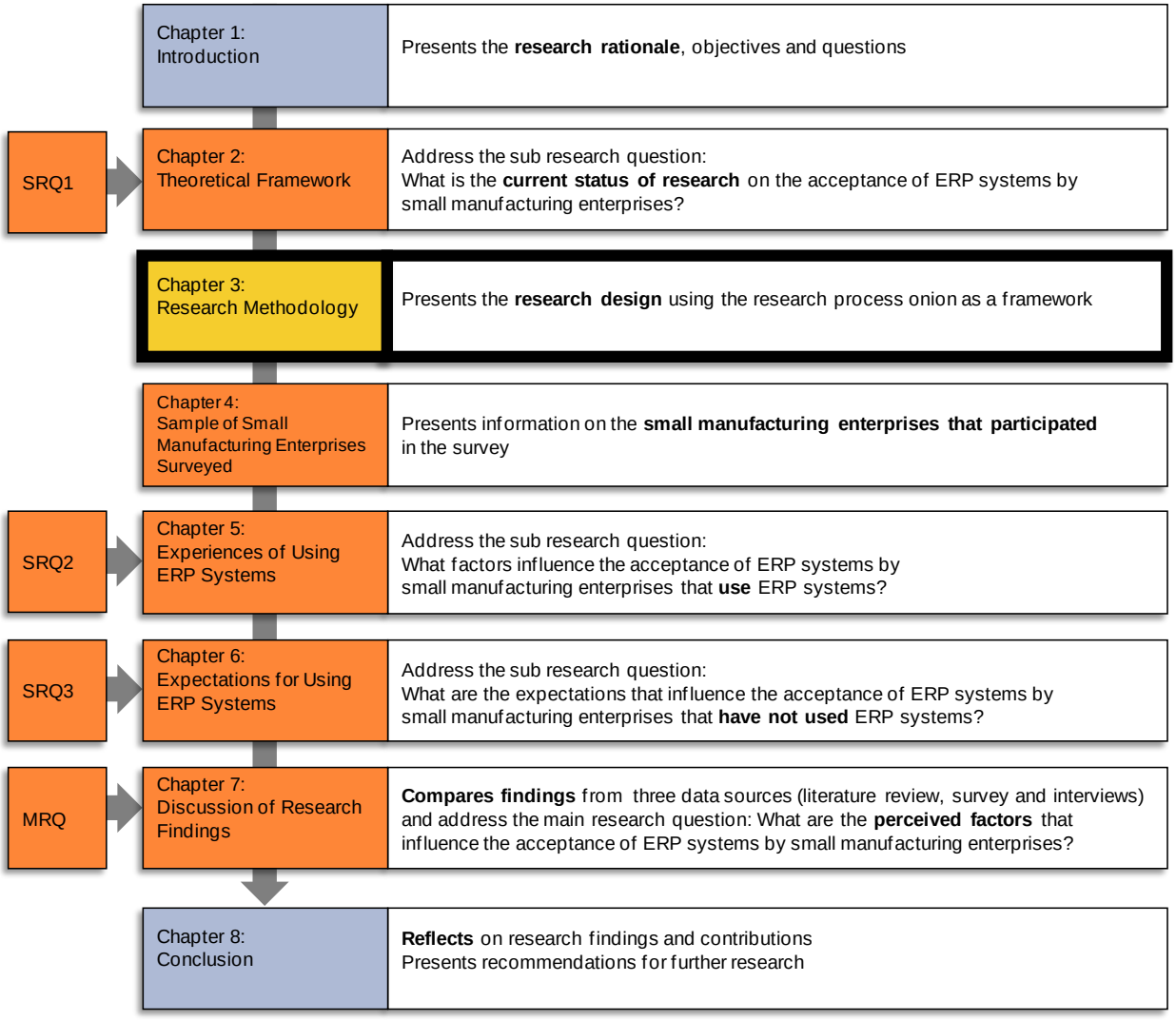
There are four gaps, as identified from literature, which will be addressed throughout this research:

1. The use of the holistic UTAUT model in assessing the acceptance of a specific technology, i.e. ERP systems.
2. The acceptance of ERP systems by small enterprises only and not small and medium enterprises.
3. Industry specific research, that is, the manufacturing industry.
4. Field study assessment and not laboratory assessment of the acceptance of ERP systems.

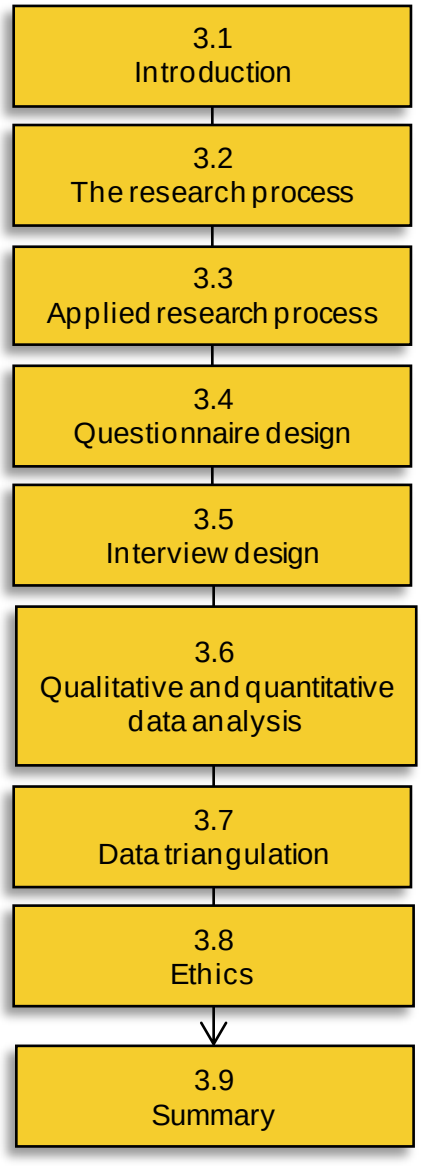
Furthermore, a categorised list of acceptance factors will be evaluated and a final list of ERP system acceptance factors for small manufacturing enterprises will then be proposed as an outcome of this study.

CHAPTER 3: RESEARCH METHODOLOGY

Stage in Dissertation



Map of Chapter 3



3.1 INTRODUCTION

A research methodology is a systematic process followed to conduct a research study [Kothari, 2005]. The research methodology assists in fulfilling the purpose of the particular study.

In the previous chapter, a literature review was presented. In this chapter, the research methodology for this study is described. A theoretical discussion on the research process onion is presented in Section 3.2. This consists of: the research philosophy, the research approach, the research strategy, the time horizon and the data collection method. Each layer of the research process onion is then used to discuss the research methodology that was followed in this study (Section 3.3). The design of the questionnaire (Section 3.4) and interview (Section 3.5) are presented before qualitative, quantitative and mixed method data analysis are described (Section 3.6). The importance of data triangulation is discussed in Section 3.7. The ethical manner in which the research was conducted is presented in Section 3.8. Finally, a summary highlighting the central elements of the research methodology adopted is presented in Section 3.9.

3.2 THE RESEARCH PROCESS

Research methodology and design can be viewed from many perspectives and is often seen as controversial [Knox, 2004]. Each study can follow a unique methodology in order to fulfil the purpose of the study. The Research Process Onion by Saunders, et al. [2003], Figure 10, is made up of different layers.

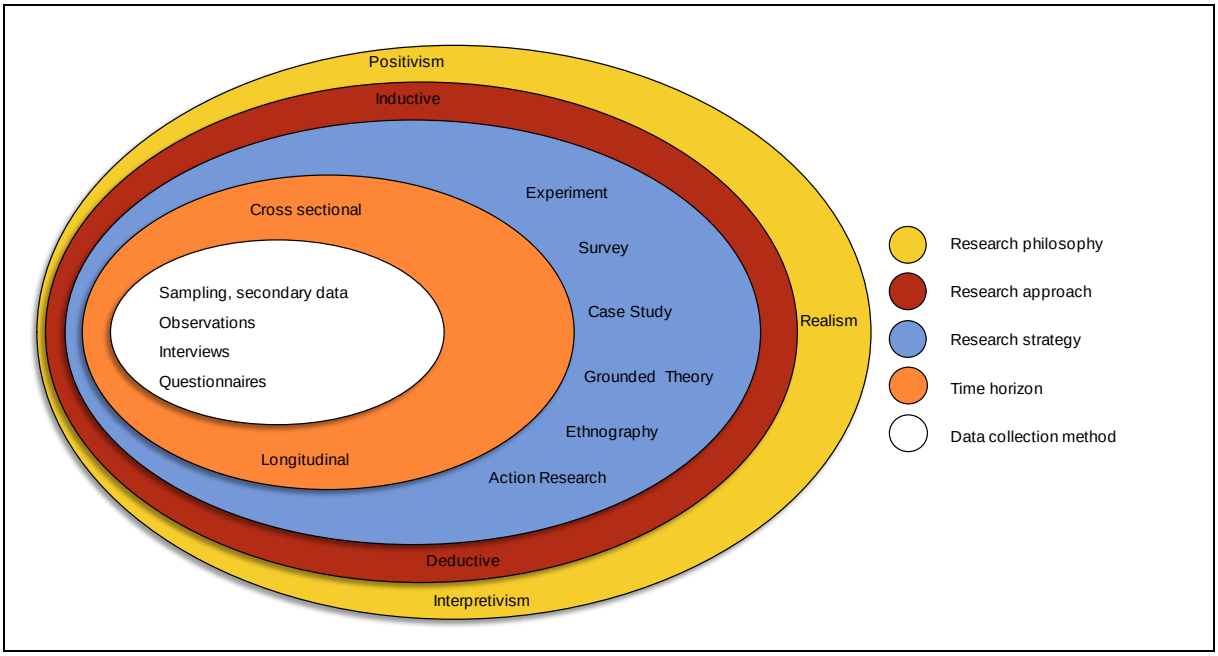


Figure 10: Research Process Onion, adapted from [Saunders, et al., 2003, p. 83]

The *onion* serves as a guide of to how to methodically approach research using different research philosophies, research approaches, research strategies, point of time horizons and data collection methods. A revised research process onion is presented in Saunders, et al. [2003]. However, the research process onion as presented in Saunders, et al. [2003, p. 83] is considered suitable for adaption and adoption for purposes of this study.

The process followed to define and design the research methodology involved *peeling away* each layer of the research process onion. This process starts with the outermost layer of the onion (research philosophy) and proceeds inwards until the core of the onion is reached (data collection methods). Each of these layers is discussed in Sections 3.2.1 to 3.2.5.

3.2.1 Research philosophy

Research stems from an underlying philosophical paradigm [Oates, 2006, p. 13]. ‘A paradigm is a set of shared assumptions or ways of thinking about some aspect of the world’ [Oates, 2006, p. 282]. There are different research philosophical paradigms, but the most prominent are positivism, realism and interpretivism. These are illustrated in the outermost layer of the research process onion.

- *Positivism* also referred to as the scientific method [Oates, 2006, p. 283], views the world as structured and ordered. Positivist researchers aim to look at the world from an objective and 'real world' perspective [Cornford & Smithson, 1996, p. 37].

- The *realistic* philosophy also commonly referred to as *critical* realism, states that 'there is a reality independent of our thinking about it that science can study' [Trochim & Donnelly, 2007]. Critical realist researchers, who subscribe to this philosophy, believe that what we perceive as reality now can be altered later. The goal is to seek out new understandings of reality [Trochim & Donnelly, 2007].

- The *interpretivist* philosophy is concerned with the social context of phenomena [Klein & Myers, 1999]. The focus is on interpreting meaning. 'The purpose is to understand how others construe, conceptualize, and understand events and concepts' [Meredith, Raturi, Amoako-Gyampah, & Kaplan, 1989, p. 307].

Oates [2006] states that the choice of the philosophical paradigm and execution of appropriate research approaches, research strategies, and data collection methods results in findings that correspond to the chosen philosophical paradigm.

Certain research philosophies correspond better to specific research approaches, research strategies, and data collection methods. However, the decision to adopt a research approach, strategy or data collection method should be considered on a case by case basis [Knox, 2004].

Section 3.3.1 discusses the research philosophy adopted in this study.

3.2.2 Research approach

The research approach affects how the research is carried out, that is, from a more general standpoint or from a more specific standpoint. Two research approaches, namely *deductive* and *inductive reasoning*, are illustrated in the second layer of the research process onion.

- *Inductive reasoning* begins its focus from a specific view and works towards a more general and conceptual understanding of theory [Wills, 2007, p. 213]. The process of inductive

reasoning is also referred to as the 'bottom-up' approach [Trochim & Donnelly, 2007], as depicted in Figure 11.

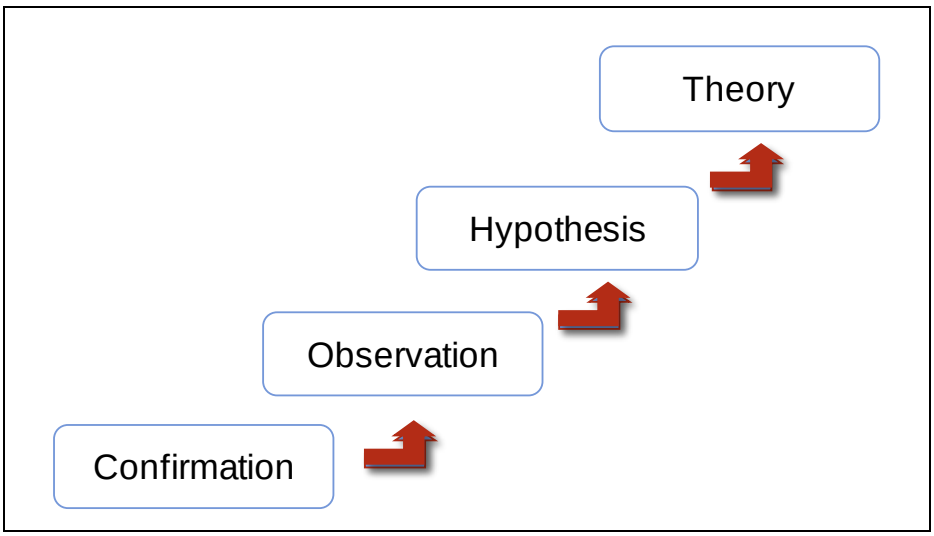


Figure 11: The process for inductive reasoning [Trochim & Donnelly, 2007]

- *Deductive reasoning* begins its focus on a general, holistic understanding of the theory and then abstracts to a specific subject of focus [Wills, 2007, p. 213]. The process of deductive reasoning is also referred to as the 'top-down' approach [Trochim & Donnelly, 2007], as shown in Figure 12.

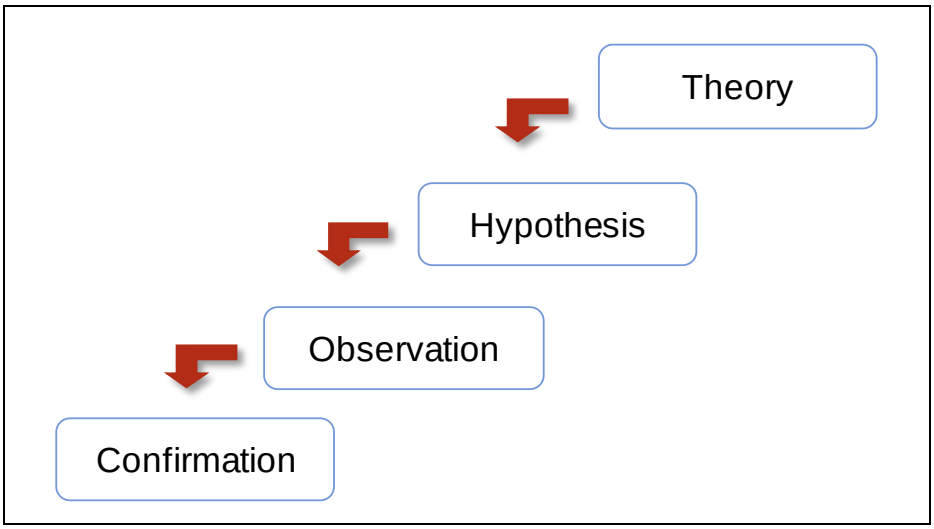


Figure 12: The process for deductive reasoning [Trochim & Donnelly, 2007]

Table 9 highlights the main differences between inductive and deductive research approaches.

Table 9: Inductive and Deductive Research [Saunders, et al., 2003, p. 89]

Deductive Reasoning	**Inductive Reasoning**
Scientific principles	
Moving from theory to data	Gaining an understanding of the meanings humans attach to events
Need to explain causal relationships between variables	Close understanding of the research context
Collection of quantitative data	Collection of qualitative data
Application of controls to ensure validity of data	More flexible structure to permit changes of research emphasis as the research progresses
Operationalisation of concepts to ensure clarity of definition	
Highly structured approach	
Researcher independence of what is being researched	Realization that the researcher is part of the research process
Necessity to select samples of sufficient size in order to generalise conclusions	Less concern with the need to generalise

In Table 9, it is illustrated that deductive reasoning focuses more on moving from theory to data collection of quantitative data and controls to ensure validity. In contrast, inductive reasoning focuses more on understanding the theory emerging from the findings and collecting qualitative data to gain an enriched understanding of interpretation of events.

Section 3.3.2 discusses the research approach adopted in this study.

3.2.3 Research strategy

A research strategy provides pre-specified procedures that should be followed to address research questions and fulfill research objectives [Oates, 2006; Yin, 2003]. Six of the popular research strategies are illustrated in the third layer of the research process onion. Each of these six research strategies is briefly discussed next.

- The first research strategy considered is an experiment. An *experiment* 'is defined as a particular kind of research strategy that aims to isolate cause and effect by manipulation of what is thought to be the causal, or independent, variable and measurement of its effect on the dependent variable(s)' [Oates, 2006, p. 128]. Experiments can take place in a laboratory setting or in the field (also referred to as field experiments, quasi-experiments, natural setting experiments) [Oates, 2006]. Davis, et al. [1989] study on the TAM made use of laboratory experiments. The assessment of TAM in a laboratory setting was critiqued by Legris, et al. [2003], who recommended that real world, social context assessment of technology acceptance be carried out. However, experiments in a real world setting make it challenging to keep control over. Experiments require a significant representative sample of research participants in order for the research to be of any value [Oates, 2006].
- The second research strategy considered is surveys. *Surveys* provide a means to 'obtain the same kinds of data from a large group of people (or events), in a standardized and systematic way' [Oates, 2006, p. 93]. Several studies [Bueno & Salmeron, 2008; Buonanno, et al., 2005; Laukkanen, et al., 2007] evaluate the acceptance, adoption, and use of ERP systems by small and medium enterprises using the survey research strategy. What was common in these surveys was the number of research participants. Surveys usually involve a significant sample size of research participants [Oates, 2006] in order to support generalisation of findings. Surveys tend to focus on quantifiable findings and not necessarily on non-quantifiable findings [Oates, 2006].
- The third research strategy considered is the case study. Yin [2003, p. 13] defines a case study as 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.' A number of researchers [Illa, Franch, & Pastor, 2000; Iskanius, et al., 2009; Liang & Xue, 2004; Light, 2005; Molla & Bhalla, 2006; Muscatello, et al., 2003; Olsen & Sætre, 2007; Verville, et al., 2005] promote the use of the case study research strategy to assess user perceptions and evidence of ERP system intervention [Huang & Palvia, 2001; Loh & Koh, 2004; Markus & Tanis, 2000; Robert Jacobs & Ted' Weston, 2007]
- The fourth research strategy is grounded theory. The *grounded theory* research strategy 'is a particular approach to qualitative research where the intention is to do field research and then analyse the data to see what theory emerges, so that the theory is *grounded* in the field data' [Oates, 2006, p. 274]. Glaser and Strauss [1967] advocate for this inductive reasoning strategy to inform theory. Although it is recognised as a research strategy in the information systems

discipline, Oates [2006, p. 276] warns about the use of a specific version of the grounded theory research strategy. There is little research that makes use of grounded theory in the ERP system acceptance research domain. One recent example is a study by Nah, et al. [2005], in which the inductive reasoning research approach is used to develop a theoretical model of end-user acceptance of ERP systems.

- The fifth research strategy that is considered is ethnography. Ethnography can be regarded as 'an art and science of describing a group or culture' [Fetterman, 2010, p. 11]. Ethnography provides a rich account of what has been investigated in a particular context. However, this account may not be generalised to other contexts [Oates, 2006, p. 182]. There is little research that makes use of ethnography in the ERP system acceptance research domain. The study done by Lee and Meyers [2004] made use of a critical ethnography research strategy to understand factors impacting on an ERP system implementation within a small-to-medium sized enterprise. The findings from the ethnographic study showed that dominant actors, political agendas and changes in strategy all influenced the implementation of the ERP system.
- The final research strategy represented is action research. *Action research* is a research strategy that involves the participation of the researcher. The researcher diagnoses a problem in a specific context. The researcher then plans to resolve the problem. The plan is then implemented. The second last activity involves evaluation to assess the resolution of the problem. Lastly, the researcher reflects on the outcomes from the intervention to resolve the problem [Oates, 2006]. Some examples of ERP system acceptance research that makes use of action research is [Akkermans & Helden, 2002; Deep, et al., 2008; Lim, et al., 2005].

Section 3.3.3 discusses the research strategy chosen for this study.

3.2.4 Time horizon

Time horizons relate to when research is conducted. This can either be at a specific point in time, or across a specific period. Two time horizons, namely *cross-sectional* and *longitudinal*, are illustrated in the fourth layer of the research process onion.

- *Cross-sectional* research takes place at a single, specific point in time [Trochim & Donnelly, 2007]. This involves collecting information at a particular section or slice of time. This can be data about the past, the present or the future.

- *Longitudinal* research takes place over a specific period of time [Trochim & Donnelly, 2007]. This involves collecting information from one point in time across to another point in time.

Karahanna, et al.'s [1999] study focuses on the pre-adoption and post-adoption of information technology and makes use of cross-sectional research. Karahanna, et al. [1999] state that findings from the cross-sectional study may not be conclusive in describing the complexity and time period of information technology adoption. Karahanna, et al. [1999] suggest follow up longitudinal studies to compare findings and give more insight to the process of the adoption of information technology over time.

Section 3.3.4 discusses the research review time adopted in this study.

3.2.5 Data collection method

A data collection method, also referred to as *data generation* method, provides a means to gather research findings [Oates, 2006, p. 36]. There are five data collection methods, including: sampling, secondary data, observations, interviews, and questionnaires. These are illustrated in the core (fifth layer) of the research process onion.

- The first data collection method is *sampling*, which refers to the process of selecting a sample from a whole population, which is then included in the research strategy [Oates, 2006, p. 95]. There are several aspects to consider when sampling. These sampling aspects include identifying the sampling frame (potential sample), sampling technique (probability and non-probability sampling techniques to select the actual sample), response rate and non-responses, and sample size. It is recommended that an adequate sample size form part of the study in order to assist in generalisation of research findings [Bartlett, Kotrlik, & Higgins, 2001]. Non-probability purposive sampling techniques were used in some ERP system acceptance and adoption studies , such as that done by Poba-Nzaou, et al. [2008]; non-probability convenience sampling techniques were used in the study done by Ramayah and Lo [2007]. Non-probabilistic sampling means that it is not necessary to have a representative sample. The researcher can also hand pick (purposive sampling) the sample to fulfil the purpose of the study or select participants who are convenient (convenience sampling) to reach. The second data collection method is *secondary data*. Secondary data includes documents, data, and information from previous studies that a researcher might use in a new study [Oates, 2006, p.

234]. Some ERP system studies [Finney & Corbett, 2007; Hakim & Hakim, 2010] make use of secondary data as part of the research methodology.

- The third data collection method is *observations*. Observations are data collection methods that observe what participants actually do [Oates, 2006, p. 202]. This is not just about *seeing* participants act within a context; it involves a careful assessment of the environment and the behaviour of the participant under observation. Observation could involve the senses of sight, sound, touch, taste and smell, depending on the context. The researcher could act as an *invisible* observer or active participant in the research process. Some ERP system studies that made used of on-site observations include: [Häkkinen & Hilmola, 2008; Lim, et al., 2005].
- The fourth data collection method presented was *interviews*. Interviews allow the researcher to constructively communicate with the research participant to obtain detailed information that cannot otherwise be obtained using other data collection methods [Oates, 2006, p. 187]. The researcher also observes the research participant during the interview interaction to assess possible changes in emotion or emotional responses to sensitive questions [Nandhakumar & Jones, 1997]. There are three forms of interviews [Oates, 2006, pp. 187-188]. Interviews can be structured (pre-defined set of standard questions only), semi-structured (research participant responses can change the standard structure of pre-defined questions), and unstructured (no pre-defined set of standard questions). Many ERP system research studies make use of interviews. The study by Deep, et al. [2008], for example, made use of semi-structured interviews to assess ERP system limitations and suggestions for ERP system improvements. A study by Buonanno, et al. [2005] made use of personal, direct interviews that accounted for a good response rate in order to assess factors affecting ERP system adoption.
- The final data collection method assessed was *questionnaires*. Questionnaires make it easier to collect large amounts of pre-defined data in a pre-determined order over a shorter period of time [Oates, 2006]. Questionnaires are often related to the survey research strategy although questionnaires can be used as part of other research strategies, such as case studies [Oates, 2006, p. 219]. The questionnaire data makes it easier for researchers to look for patterns within the research findings. These patterns can be used to generalise findings from the sample to the larger population under study [Oates, 2006]. Questionnaires can be *self-administered* (completed by the research participant without the assistance of the researcher) or *researcher-administered* (the researcher completes the questionnaire after asking for a response from the research participant). Several ERP system research studies have made use of formal questionnaires to gather responses from users of ERP systems [Reuther & Chattopadhyay,

2004], top level management [Raymond & Uwizeyemungu, 2007], as well as small, medium and large enterprises [Bernroider & Koch, 2000; Koh & Simpson, 2005] regarding perceptions about ERP system use.

Sections 3.3.5, 3.4 and 3.5 discuss the data collection methods adopted in this study.

3.3 APPLIED RESEARCH PROCESS

The research methodology adopted in this study is discussed in Sections 3.3.1 to 3.3.5.

3.3.1 Research philosophy

The interpretivist research philosophy was adopted, as it was the interpretation and meaning of the findings [Klein & Myers, 1999; Walsham, 1995] of small manufacturing enterprise ERP system acceptance that was of interest to this study.

Multiple and diverse facets of reality were considered, rather than one view that is evident of 'the truth' [Oates, 2006, p. 292]. A small manufacturing enterprise is not a generic enterprise. There are a number of small manufacturing enterprises operating in different manufacturing sectors, each with a diverse understanding of sector-specific terminology. Small manufacturing enterprises in one manufacturing sector have similarities with small manufacturing enterprises in other manufacturing sectors as well as differences. In terms of objectivity of research, research reflexivity [Oates, 2006] was maintained. In interpretivism, it is believed that the interpretivist researcher, through detailed understanding and analysis infers own beliefs in the interpretation of findings. Walsham [1995] refers to this dilemma as second-order concepts in interpretive studies. All perspectives were taken into account and distinguished to differentiate interpretation of field findings from personal interpretation.

3.3.2 Research approach

While inductive reasoning is commonly associated with interpretivist views [Knox, 2004], the deductive reasoning research approach is seen as more appropriate for adoption. This is in line with the view of Knox [2004] that the research philosophy should not limit the selection of research approach, as it should be carefully considered in terms of the context and appropriateness of the study.

Deductive reasoning allowed me to first concentrate on collecting literature findings on small manufacturing enterprise ERP system acceptance factors and then to focus on obtaining field findings to confirm or refute the findings and to comment on these literature findings. Figure 13 illustrates the top-down research approach followed.

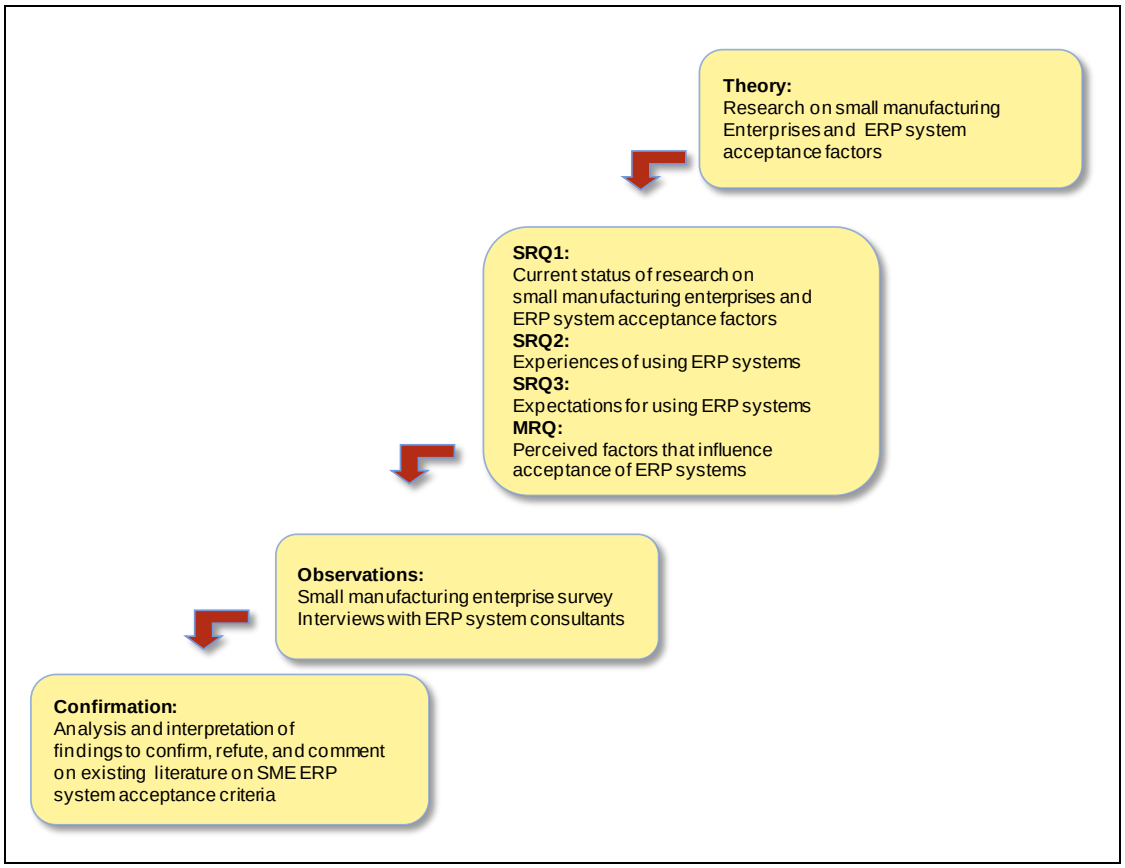


Figure 13: Deductive reasoning, adapted [Trochim & Donnelly, 2007]

This research approach involved first reviewing literature that focuses on small manufacturing enterprises and ERP system acceptance. The next step was to clearly define the research questions to be addressed. The third step involved conducting 'observations'. Two forms of 'observations' were conducted. The first 'observation' involved gathering data from small manufacturing enterprises through the use of a survey questionnaire. The second 'observation' involved gathering data from ERP system consultants through the use of interviews. The final step involved analysing the findings collected from the research participants to confirm or refute the findings, and comment on the literature findings, that is, theory of small manufacturing enterprise acceptance of ERP systems.

3.3.3 Research strategy

An interpretive survey research strategy was adopted. Surveys are traditionally associated with positivistic research, where the focus is on discovering the same patterns of findings across a substantial number of participants under study, and then generalising these to the larger population [Oates, 2006]. Surveys can, however, be associated with interpretive studies [Oates, 2006, p. 93].

The motivation for using this research strategy was not only to inform an understanding of acceptance of ERP systems by small manufacturing enterprises, but to find possible patterns of ERP system acceptance that could not easily be collected using alternate research strategies.

The survey was not intended to generalise the findings of the survey, since the sample size (Section 3.3.3.4) was not significantly representative of small manufacturing enterprises in South Africa. The interpretive findings provided insight into acceptance, which can be replicated in further, large scale surveys of small manufacturing enterprises in terms of their experiences and expectations for using ERP systems. Sections 3.3.3.1 to 3.3.3.4 discuss the process of sampling research participants.

3.3.3.1 Sampling frame

The small manufacturing enterprises were selected by consulting business databases and telephone directories of small manufacturing enterprises in Gauteng, South Africa. These databases and directories contained contact information for potential small manufacturing enterprises to be sampled from.

3.3.3.2 Sampling technique

As indicated in Section 3.2.5, studies make use of various sampling techniques and the use of non-probability purposive sampling techniques, e.g. Poba-Nzaou, et al. [2008], are common when researchers prefer not to generalise, but to understand the topic in-depth. This survey used a non-probability purposive sampling technique, as it enabled more freedom in terms of the number of issues that could be investigated, such as instances that may be different, 'extreme, unusual or somehow atypical' [Oates, 2006, p. 98].

3.3.3.3 Response rate and non-response

Telephone calls and physical visits to small manufacturing enterprises assisted in obtaining research participants. It was easier to generate interest in participation with physical visits rather than via telephonic conversations with small manufacturing enterprise representatives. There were three main reasons for non-participation of small manufacturing enterprises either the enterprises were: too busy during the period August to November 2009; interested but not keen; or not interested at all in participating in the study.

3.3.3.4 Sample size

The final sample size of small manufacturing enterprises that participated in the survey was 16. It is realised that although the sample size may not yield statistically interesting results, nonetheless, it provided important insights into ERP system acceptance by small manufacturing enterprises. As mentioned, the focus of this study is not to generalise, but to explore this relatively young research domain.

Section 3.3.5 introduces the questionnaire as the data collection method used for the survey. Section 3.4 details the design of the questionnaire.

3.3.4 Time horizon

A cross sectional time horizon was adopted for this study. This study did not wish to examine the longitudinal changes to ERP system acceptance.

There are several periods associated with cross sectional research [Oates, 2006]. *Historical* and *short-term* studies are examples of two types of studies based on the aspect of time. Historical studies focus on past events; short-term studies examine present events.

A *short-term* study approach was adopted. However, because of the dynamic nature of this study, i.e. incorporating small manufacturing enterprises that use ERP systems and those that have not; questions relating to previous and current experiences, as well as to future expectations regarding ERP systems were asked as part of the survey.

3.3.5 Data collection method

Questionnaires and interviews are widely used data collection methods in information systems research [Oates, 2006]. However, before one selects a data collection method, one needs to understand the type of data that needs to be collected. It was important to collect two types of data in the survey: data *indirectly related* to the study and data *directly related* to the study.

Indirectly related data included demographic information, such as manufacturing sector, year of establishment of enterprise, age of employees, and gender of employees. Data indirectly related to the study are presented in Chapter 4: Sample of Small Manufacturing Enterprises Surveyed.

Data that focuses on the acceptance of ERP systems, particularly strategic, business, technical, and human acceptance factors relate to data that is *directly* related to the study. Data that is directly related to the study are presented in Chapter 5: Experiences of Using ERP Systems and Chapter 6: Expectations for Using ERP Systems.

The design of the questionnaire used as part of the survey, is discussed in Section 3.4. The details of the interview and questions used as part of the data triangulation exercise (Section 3.7) follows in Section 3.5.

3.4 QUESTIONNAIRE DESIGN

The questionnaire focused on obtaining the view of small manufacturing enterprises regarding ERP system acceptance. Small manufacturing enterprises that currently use ERP systems and small manufacturing enterprises that do not use ERP systems but intend to make use of ERP systems, participated in the study.

The owners or managers of the small manufacturing enterprises were asked to respond to the questions posed in the questionnaire, on behalf of the small manufacturing enterprise. Researcher-administered questionnaires were used. This approach, of assisting with the completion of the questionnaire, made it easier for research participants to focus on providing their responses, without having to complete the questionnaire themselves. It also ensured a high response rate because of assistance being provided with the completion of the questionnaire.

The questionnaire design process is detailed in Sections 3.4.1 to 3.4.5.

3.4.1 Questionnaire layout and structure

The questionnaire (Appendix B: Research Questionnaire) included an introduction in the first section of the questionnaire. The '*Before you begin to answer*' section explained the study, the research participant's participation in the study and the confidentiality aspect. After reading the opening section of the questionnaire, and if the research participant agreed to take part in the study, the research participant was requested to read and acknowledge the '*Research Participant's Permission*' form to confirm participation in the study (refer to Section 3.8: Ethics). As the researcher, I also acknowledged that I would not share confidential responses. Instructions were provided as a guideline before research participants were allowed to respond to the questions.

The body of the questionnaire consisted of three sections: Section "A", which ALL participants had to respond to; Section "B, which participants who have experience in using ERP systems had to respond to; and Section "C", which participants who have no experience in using ERP systems had to respond to. Section 3.4.2 discusses the question types and response format and Section 3.4.3 discusses the content and wording of questions asked.

The final part of the questionnaire asked for additional comments and thanked the research participants for their time and assistance in taking part in the study.

3.4.2 Question types and response format

Open, closed, factual, and opinion type questions were asked to obtain demographic, direct, and motivated responses. Research participants were encouraged to provide substantiating comments to support responses.

An example of an open opinion related question, designed for the research participant to give further response to the initial closed question, is:

Do you experience a difference between male and female employees using ERP systems? If yes, please motivate your answer.

An example of a closed question, designed to restrict the research participant's response is:

What would you rate the average computer skill levels of users of ERP systems?

Excellent	Good	Neither Good nor Bad	Bad	Dismal

Six types of questions and response formats were used in the questionnaire. Table 10 lists format and examples of questions and responses used.

Table 10: Questionnaire, question and response format

No.	**Format**	**Question and response example**
1.	Yes/No	*Is your enterprise currently using any business management system?* **Yes** ☐ **No** ☐
2.	Quantity questions *Makes use of a scale to group years of enterprise operation.	**How many years has your enterprise been operating?* > 20 years 16-20 11-15 6-10 1-5 < 1 year **- Continued on next page -**

Table 10: Questionnaire, question and response format (Continued)

<table>
<tr><td>3.</td><td>Agree/disagree with a statement</td><td>Would brand reputation influence your decision to use an ERP system?
<table><tr><td>Agree</td><td></td></tr></table> <table><tr><td>Disagree</td><td></td></tr></table></td></tr>
<tr><td>4.</td><td>Degree of agreement or disagreement – the ‘Lickert scale’</td><td>Using our ERP system is a good idea.
<table><tr><td>Strongly Agree</td><td>Agree</td><td>Neither Disagree nor Agree</td><td>Disagree</td><td>Strongly Disagree</td></tr></table></td></tr>
<tr><td>5.</td><td>Scale questions</td><td>What would you rate the average computer skill levels of users of ERP systems?
<table><tr><td>Excellent</td><td>Good</td><td>Neither Good nor Bad</td><td>Bad</td><td>Dismal</td></tr></table>
- Continued on next page -</td></tr>
</table>

Table 10: Questionnaire, question and response format (Continued)

<table>
<tr>
<td>6.</td>
<td>Rank order questions

Rank order questions were believed to make it easier for research participants to respond to.</td>
<td>Please rank the following reasons on why you would use an ERP system in order of most important (1) to least important (13)
<table>
<tr><td>Industry necessitates the use of an ERP system</td></tr>
<tr><td>Advance business operations</td></tr>
<tr><td>Manage complexity and cost efficiently adapt to changes</td></tr>
<tr><td>Competition in industry</td></tr>
<tr><td>Enables business growth and strategic alignment</td></tr>
<tr><td>Promote transparent governance and improve operational efficiency</td></tr>
<tr><td>Manage cash, liquidity, and financial risk better</td></tr>
<tr><td>Manage the workforce through rapid change</td></tr>
<tr><td>Better business planning and consolidation</td></tr>
<tr><td>Improve stakeholder relationship and trust</td></tr>
<tr><td>Timely analytical-supported decision-making ability</td></tr>
<tr><td>Cost saving through optimisation of IT (information technology)</td></tr>
<tr><td>Follow industry best practices</td></tr>
</table>
</td>
</tr>
</table>

For the degree of agreement or disagreement format of question, a five-point Lickert scale [Mogey, 1999] was used. The items on the scale were coded, as indicated in Table 11.

Table 11: Lickert scale item codes

Code	**Lickert scale item**
1	Strongly Agree
2	Agree
3	Neither Disagree nor Agree
4	Disagree
5	Strongly Disagree

There is criticism regarding the inclusion of the 'Neither Disagree nor Disagree' item on the scale as research participants may tend to select this response without truly reflecting on it [Oates, 2006, p. 227]. Nevertheless, the option of responding either 'Neither Disagree or Agree' was provided for use if the small manufacturing enterprise could not agree or disagree with a particular statement.

According to Mogey [1999], the data collected using the Lickert scale is ordinal data. The best technique recommended for an overview interpretation of the data would be a descriptive technique. This statistically descriptive technique is the mode. The mode refers to the most frequently occurring value in a data set [Oates, 2006, p. 256]. This study made use of the mode to determine the most frequently selected response on the Lickert scale.

3.4.3 Question content and wording

The content and wording of the final 33 questions were designed to be to the point, relevant, unambiguous, specific and objective, so as not to confuse or lead the research participant.

Several types of questions were asked of the small manufacturing enterprises surveyed. Not all questions were directed to all small manufacturing enterprises. Specific questions were directed to specific small manufacturing enterprises. Questions relating to background information about the manufacturing sector, gender of employees, age of employees, and perceived ERP system experience of employees were asked of all enterprises. Small manufacturing enterprises were then asked to rank strategic, business, technical and human ERP system factors found in the literature review (Section 2.5: Technology acceptance of ERP systems). The statements (Section 2.2.2, The UTAUT Model, Table 2) used to test the UTAUT model [Venkatesh, et al., 2003] were used to assess the acceptance of ERP systems. These statements were adapted for small manufacturing enterprises that have experience in using ERP system as well as for small manufacturing enterprises that do not have experience in using ERP systems. The original UTAUT statements were adapted to read as *ERP systems* and not *the system*, to indicate the specific technology for which acceptance was being assessed.

The motivation for asking a particular question in Section "A", "B", and "C" of the questionnaire is elaborated in Tables 12, 13, 14, respectively.

Table 12: Section "A" questions

Section "A": Background information

Legend:	Asked of all small manufacturing enterprises	Asked only of small manufacturing enterprises that have used or are currently using ERP systems

No.	Question	Motivation
1.	What would best describe the manufacturing sector in which your small manufacturing enterprise operates?	This question asked about the manufacturing sector in which a small manufacturing enterprise operates. The motivation was to look for possible patterns between the type of manufacturing sector and use of ERP systems.
2.	How many years has your enterprise been operating?	The purpose of this question was to determine the period of operation of the enterprise. Being a relatively young small manufacturing enterprise or a mature small manufacturing enterprise may indicate interest in ERP systems at different stages of enterprise operation.
3.	How many employees do you have?	This question asked about the number of employees within a small manufacturing enterprise. The number of employees is used to classify the size of the small manufacturing enterprise.

- Continued on next page -

Table 12: Section "A" questions (Continued)

<table>
<tr><td>4.</td><td>Are you familiar with the following ERP systems?</td><td>The purpose of this question was to understand a small manufacturing enterprise's familiarity with available ERP systems.</td></tr>
<tr><td>5.</td><td>Is your enterprise currently using any ERP system?</td><td>The purpose of this question was to determine if a small manufacturing enterprise is using any ERP system.</td></tr>
<tr><td>6.</td><td>What sort of ERP system is implemented?</td><td>The purpose of this question was to determine specific types of ERP systems used within the small manufacturing enterprise, if any.</td></tr>
<tr><td>7.</td><td>What would you rate the average computer skill levels of users of ERP systems?</td><td>The purpose of this question was to determine the perception of computer and ERP system skills. This may indicate ERP system readiness and use.</td></tr>
<tr><td>8.</td><td>Which of the following best describes features that an ERP system should deliver? You can ✓more than one choice, if applicable.<table><tr><td>Customer relationship management</td></tr><tr><td>Supplier relationship management</td></tr><tr><td>Manufacturing execution management</td></tr><tr><td>Financial management</td></tr><tr><td>Human resource management</td></tr><tr><td>Business intelligence / Analytics</td></tr><tr><td>Other: (Please specify if applicable)</td></tr></table></td><td>The purpose of this question was to determine what components, more specifically what functionality, an ERP system should provide to a small manufacturing enterprise.

- Continued on next page -</td></tr>
</table>

Table 12: Section "A" questions (Continued)

9.	Please rank the following reasons on why you would use an ERP system in order of most important (1) to least important (13) Industry necessitates the use of an ERP system Advance business operations Manage complexity and cost efficiently adapt to changes Competition in industry Enables business growth and strategic alignment Promote transparent governance and improve operational efficiency Manage cash, liquidity and financial risk better Manage the workforce through rapid change Better business planning and consolidation Improve stakeholder relationship and trust Timely analytical-supported decision-making ability Cost saving through optimisation of IT (information technology) Follow industry best practices	The purpose of this question was to determine the importance of certain strategic and business acceptance factors over other strategic and business acceptance factors. This should ideally indicate the most important factors influencing a small manufacturing enterprise's decision to purchase and use an ERP system. **- Continued on next page –**

Table 12: Section "A" questions (Continued)

10.	What would you say are the three most important factors that would influence your decision to purchase an ERP system for your enterprise? • Low total cost of ownership – maintenance, upgrades, consultation, training, etc • Provision of functionality on-demand with the ability to "switch on and switch off" functionality • Integration with other business systems • Accessibility: anytime, anywhere, including mobile and web accessibility • Quick implementation time • "Start and go" self-learning – minimal training costs • Long term investment sustainability • Intelligent aware – helps alerts to changes in market forces • User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done	The purpose of this question was to determine the three most important acceptance factors (irrespective of the factors being strategic, business, technical or human) that a small manufacturing enterprise takes into account when purchasing and using an ERP system. A decision to 'pool together' strategic, business, technical, and human acceptance factors was made instead of asking the small manufacturing enterprise to rank their top three strategic, business, technical, and human acceptance factors. This question is not intended to cross-reference the findings from Question 10. However, similar responses are expected for Question 10 and 11.
11.	Would brand reputation influence your decision to use an ERP system?	The purpose of this question was to determine if brand reputation of the ERP system is an important factor in purchasing and using an ERP system.

The responses received to the questions posed in Section "A" of the questionnaire are presented in Chapters 4, 5 and 6. A discussion of these findings is presented in Chapter 7: Discussion of Research Findings.

Table 13: Section "B" questions

Section "B": Experiences of using ERP systems

Small manufacturing enterprises that have used or currently use an ERP system, were asked to rate their level of agreement with the statements given in this section of the questionnaire. These statements were adapted from statements used to estimate the UTAUT model [Venkatesh, et al., 2003, p. 460].

Legend:	**Asked only of small manufacturing enterprises that have used or are currently using ERP systems**

No.	**Statement**
	Performance expectancy
1.	Using our ERP system enables us to accomplish tasks more quickly.
2.	Using an ERP system increases our productivity.
	Effort expectancy
3.	The interface of an ERP system should be clear and understandable.
4.	Learning to use our ERP system is easy for us.
	Social influence
5.	People who influence our behaviour think we should use an ERP system.
6.	People who are important to us think we should use an ERP system.
7.	The management of our enterprise has been helpful in the use of our ERP system.
8.	In general, our enterprise has supported the use of an ERP system.
	Facilitating conditions
9.	We have the resources necessary to use an ERP system.
10.	We have the knowledge necessary to use our ERP system.
11.	Our ERP system is not compatible with other systems we use.
12.	A specific person (or group) is available for assistance with our ERP system's difficulties.

The responses received to the statements presented in Section "B" of the questionnaire are presented in Chapter 5: Experiences of Using ERP Systems. These findings are compared to findings gathered from statements posed to small manufacturing enterprises that do not use ERP systems (Table 14). A discussion of the comparison of findings is presented within Chapter 7: Discussion of Research Findings.

Table 14: Section "C" questions

Section "C": Expectations for using ERP systems

Small manufacturing enterprises not using an ERP system, were asked to rate their level of agreement with the statements given in this section of the questionnaire. These statements were adapted from statements used to estimate the UTAUT model [Venkatesh, et al., 2003, p. 460].

Legend:	**Asked only of small manufacturing enterprises that do not use an ERP system.**

No.	**Statement**
	Performance expectancy
1.	We may find an ERP system useful in our enterprise.
2.	If we use an ERP system, it may increase our chances of becoming more profitable.
	Effort expectancy
3.	The interface of an ERP system should be clear and understandable.
4.	It should be easy for us to become skilled at using an ERP system.
5.	We should find an ERP system easy to use.
	Social influence
6.	People who influence our behaviour think we should use an ERP system.
7.	People who are important to us think we should use an ERP system.
	Facilitating conditions
8.	We have the resources necessary to use an ERP system.
9.	We have the knowledge necessary to use an ERP system.
10.	ERP systems may not be compatible with other systems we use.

The responses received to the statements presented in Section "C" of the questionnaire are presented in Chapter 6: Expectations for Using ERP Systems. These findings are compared to findings gathered from statements posed to small manufacturing enterprises that have used or currently use an ERP system (Table 13). Finally, a discussion of the comparison of findings is presented within Chapter 7: Discussion of Research Findings, with concluding statements on all findings presented in Chapter 8: Conclusion.

3.4.4 Validity and reliability

The questionnaire designed was assessed for content validity, construct validity, and reliability.

- Content validity 'measures the degree to which the test items represent the domain or universe of the trait or property being measured'[Key, 1997]. ERP system acceptance factors were sourced from technology acceptance and ERP systems literature. The ERP system acceptance factors assessed in the questionnaire were selected from the literature review of ERP system acceptance factors. This grounded content validity of the questionnaire.
- 'The construct validity approach concerns the degree to which the test measures the construct it was designed to measure' [Key, 1997]. The statements adapted from estimating the UTAUT model were tested for construct validity by [Venkatesh, et al., 2003]. The qualities of strategic, business, technical, and human acceptance factors were sourced from literature and deemed suitable to measure the construct of acceptance of ERP systems.
- 'The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials.' The process of pilot testing (testing and retesting) of the questionnaire assisted in ensuring reliability of the questionnaire in soliciting responses.

3.4.5 Pre-test and pilot

A process of pilot testing using fellow researchers was conducted to ensure readiness of the questionnaire. The pilot test assisted in refining and improving the questionnaire. The final questionnaire can be found in Appendix B: Research Questionnaire.

3.5 INTERVIEW DESIGN

The interview focused on obtaining the views of small manufacturing enterprise ERP system consultants about small manufacturing enterprise ERP system acceptance. The interview planning process is detailed in Sections 3.5.1 to 3.5.8.

3.5.1 Type of interview

Two face-to-face, semi-structured interviews were conducted with ERP system consultants (Appendix E: ERP System Consultant Research Participants). The motivation for using only two interviews was that this was a triangulation exercise (Section 3.7) to confirm the results gathered from the small manufacturing enterprises. A set of pre-structured questions were asked. The researcher opted for the flexibility to ask additional questions, depending on topic of conversation and responses from the consultant. This type of interview allowed for further inquiry into the consultants' perspectives on ERP system acceptance by small manufacturing enterprises.

3.5.2 Researcher's role and identity

The researcher's role as the interviewer was characterized by a professional and courteous demeanour. The consultants have busy schedules and inconveniencing them in terms of their daily work schedule was minimised. The consultants were not coerced into responding to questions. Impartiality to responses was maintained, with the researcher only asking for clarification and confirmation of responses. The most important data was collected first, the change in structure of the interview (semi-structured interview) managed and time limits maintained.

3.5.3 Interview preparation

The purpose of the interviews was to enquire about the views of the ERP system consultants regarding small manufacturing enterprises and ERP system acceptance factors. These questions were prepared based on the ERP system acceptance factors identified from the literature review (Chapter 2). The interview questions were based on the responses from the small manufacturing enterprises (Chapter 5 and Chapter 6). Table 15 lists the generic interview questions asked and provides the reason for asking a particular question. These questions were not sent to the consultants prior to the interviews taking place.

Table 15: Interview questions

Interview Questions		
No.	**Question**	**Reason**
1.	In your experience, how would you describe the acceptance, acquisition and/or adoption of ERP systems by small manufacturing enterprises in South Africa?	The purpose of this question was to determine the consultant's view on ERP systems and small manufacturing enterprises.
2.	What are the positive and negative issues that can be ascertained from user evaluation surveys or interviews done with small manufacturing enterprises?	The purpose of this question was to determine the consultant's view on end user feedback regarding the use of ERP systems.
3.	What comments can you offer about the responses from small manufacturing enterprises when asked to rank the ERP system acceptance factors?	The purpose of this question was to determine the consultant's view on small manufacturing enterprises ranking ERP system acceptance factors, as evident from the survey.
4.	In your opinion, when is a small manufacturing enterprise ready to accept an ERP system?	The purpose of this question was to determine the consultant's view on the readiness of small manufacturing enterprise to accept ERP systems.
5.	Which factors, in your view, are more important than any others in influencing acceptance of ERP systems?	The purpose of this question was to determine the consultant's view on important acceptance factors.
6.	Is there anything you would like to add?	This was an open question. The purpose of this question was to solicit additional comments (if any) from the consultant.

A mock interview was done to ensure clarity and completeness of questions. This helped to refine questions and ask additional questions that were not previously considered.

3.5.4 Scheduling

The interviews were scheduled and conducted on-site at the ERP vendor offices during late January and early February 2010. The ERP system consultants who agreed to participate in the interviews were sales executives. These consultants were randomly selected from ERP systems sales executives provided by small manufacturing enterprises that currently use ERP systems. The first interviewee was from *Softline Pastel* and the second interviewee from *QuickBooks, EasyBiz (PTY) Ltd*.

3.5.5 Recording

To a large extent, handwritten field notes and digital audio recordings were used to record consultants' responses. Permission was asked from the consultants to make notes and to use a digital recorder during the interview. The combination of the two forms of recording assisted in capturing all responses as accurately as possible. All interview responses, together with the final list of questions asked of each consultant, are presented in Appendix F: Interview Responses.

3.5.6 Seating and equipment

An interview room in which to conduct the interview was arranged by the consultants at their offices. The consultant was comfortable in the meeting room setting. No equipment needed to be setup, except for switching on the digital recorder at the beginning of the interview.

3.5.7 The interview

The interview began with an introduction and background to the study being provided. The '*Before the Interview*' section assisted in explaining the study, the consultant's participation in the study and the confidentiality of responses. If the consultant agreed to take part in the study, the consultant was requested to read and acknowledge the '*Research Participant's Permission*' form to confirm participation in the study (Section 3.8: Ethics). It was specified that confidential responses would not be shared. The procedure for answering interview questions was explained prior to starting the interview.

A set of six pre-defined interview questions, as presented in Table 15 (and Appendix C: Interview Questions), were used. The questions set out to identify the consultants' perspectives on ERP system acceptance by small manufacturing enterprises. All the questions were open-ended questions that were used to gather as detailed a response as possible. Confirmation and

explanatory questions that were not part of the pre-defined set of questions were asked to clarify and obtain further feedback.

The closing question allowed the consultant to comment on additional details that may not have been addressed during the interview. The interview lasted for approximately 45 minutes and ended with acknowledging the participation of the consultant. An enquiry was made regarding confirmation of responses and the consultants agreed to follow-up sessions.

3.5.8 Transcribing

The field notes and digital audio files were transcribed after the interviews. The process of transcribing the notes assisted in *reliving the interview*. The interview findings were used in the data triangulation (Section 3.7) process to support the outcomes of this study.

The manner in which the findings from the interviews, as well as the questionnaire, were analysed is presented in Section 3.6.

3.6 QUALITATIVE AND QUANTITATIVE DATA ANALYSIS

Two types of data analysis are recognised in information systems research, namely quantitative and qualitative analysis [Oates, 2006]. *Quantitative data analysis* makes use of statistical and mathematical formulae and tools to quantify research findings [Oates, 2006]. *Qualitative data analysis* 'looks for themes and categories within words people use …' [Oates, 2006, p. 38]. Qualitative analysis is suited to interpretivistic research as it is the richness and meaning of data that is required [Flick, 2009; Klein & Myers, 1999; Myers & Newman, 2007]. It is also possible to make use of a *mixed data analysis approach* that combines quantitative and qualitative analysis [Bazeley, 2002].

This study makes use of a mixed data analysis approach because 'mixed methods are used to enrich understanding of an experience or issue through confirmation of conclusions, extension of knowledge or by initiating new ways of thinking about the subject of the research' [Bazeley, 2002, p. 9].

Bazely [2002, p. 6] states that ‘coding or categorizing of data is undertaken to facilitate understanding and retrieval of information.’ All research findings were coded to assist in categorization and review of the numerous small manufacturing enterprises’ ERP system acceptance issues. The type of coding used to measure responses for the UTAUT model statements was discussed in Section 3.4.2: Question types and response format. The statistical technique of determining the mode was use to determine the ranking of acceptance factors (from most important to least important in the order of 1 to 13, with 13 being the least important). The last form of coding was concepts and themes, in which literature, questionnaire and interview findings were grouped according to themes.

3.7 DATA TRIANGULATION

The use of more than two data generation methods improves the quality of research results and conclusions [Benbasat & Zmud, 1999; Oates, 2006, p. 37]. Three data generation methods (findings from the literature review, findings from the survey of small manufacturing enterprises and findings from interviews conducted with ERP system consultants) were used to ensure validity [Campbell & Fiske, 1959; Mathison, 1988], confirmation and completeness of final research results presented (Chapter 7). The final categorised list of proposed ERP system acceptance factors for small manufacturing enterprises results from the process of data triangulation. The described process of data triangulation is depicted in Figure 14. The triangulation of data assisted in reinforcing themes and patterns that emerged from individual data collection methods.

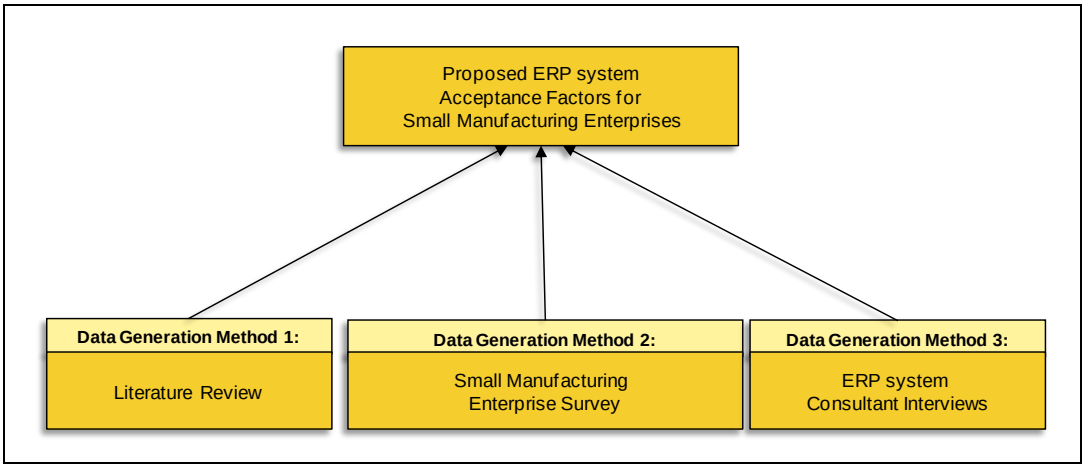


Figure 14: Data Triangulation

3.8 ETHICS

Research needs to be conducted in an ethical manner [Hofstee, 2006; Oates, 2006]. A number of ethical concerns were considered from the outset (Section 1.9: Ethical considerations).

In conducting this research, it was important to establish mutual trust between the research participant and the researcher [Saunders, et al., 2003, p. 257]. The intrusion of the researcher in the environment of the small manufacturing enterprise and the ERP system consultants was limited. Prior arrangements were made that would limit intrusion and hampering of normal work activity. Each participant was approached in the same manner and a standard script was created to communicate effectively with the small manufacturing enterprises and ERP system consultants. This script is presented in Appendix A: Recruiting Research Participants. All non-quantifiable information, such as quoting important comments, were attributed to the speaker using pseudonyms in order to protect the identity of the research participant. The analysis of qualitative findings was done as objectively as possible and any interpretations made were done within the context of the subject matter.

All research participants were informed of their right of voluntary participation and right to withdraw from the process. The participants were informed about the nature of the study and the nature of their participation in the study. A fundamental concern that was raised by certain small manufacturing enterprise research participants was confidentiality and sharing of enterprise and

trade secrets. The research participants were reassured that all personal information provided would be anonymised.

3.9 SUMMARY

This chapter presented reasons for adopting a specific research methodology. Figure 15 illustrates a research process onion (Section 3.2) that provides a high-level overview of the research methodology adopted.

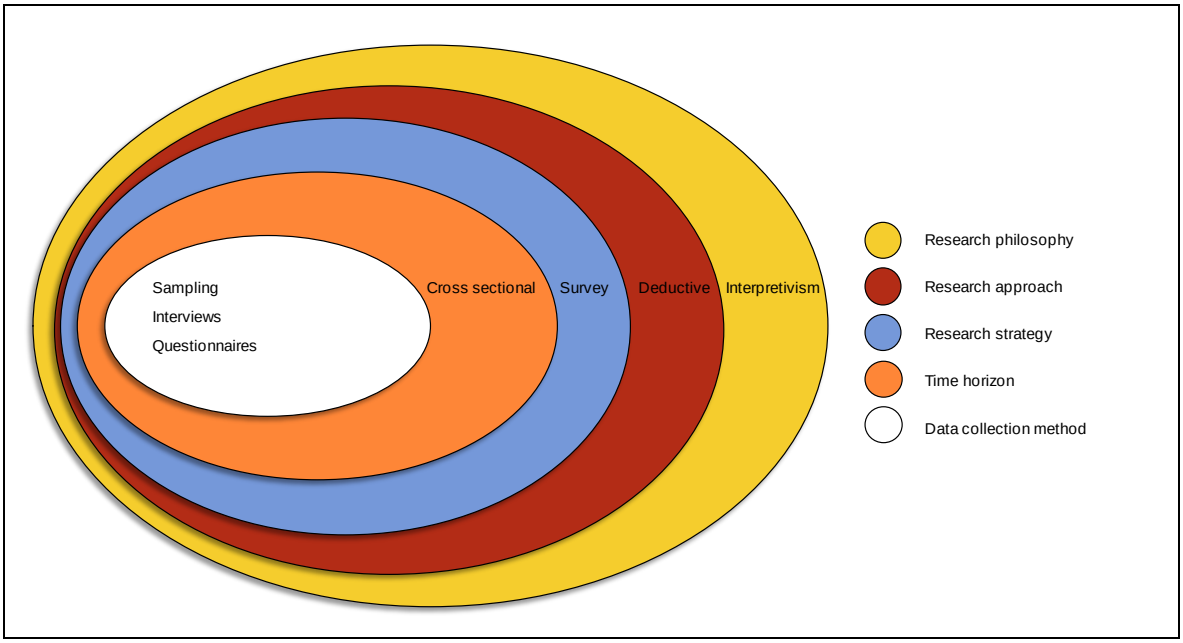


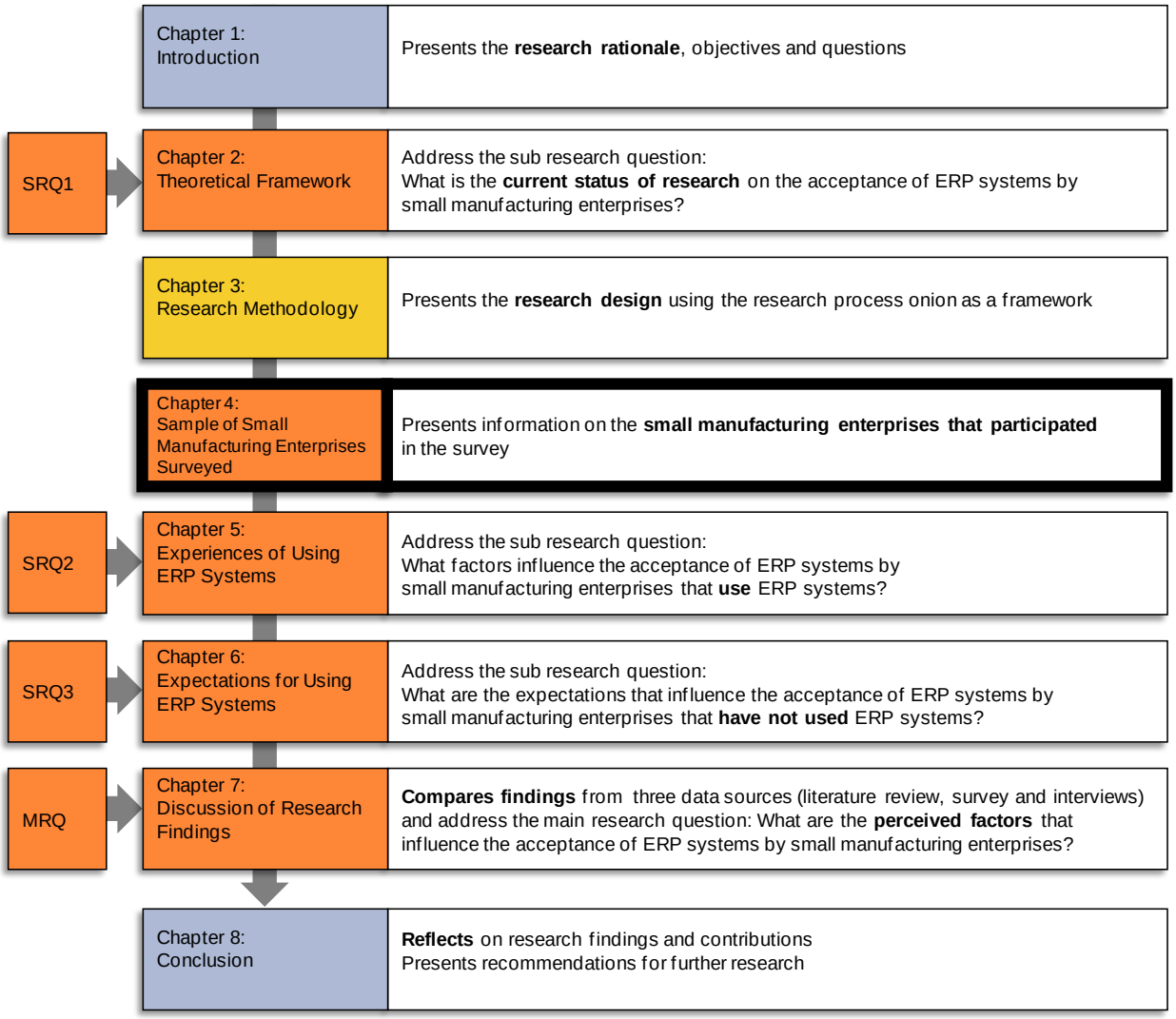
Figure 15: Adopted research process onion

A cross-sectional, interpretive survey was adopted because it was deemed important to interpret the meaning of multiple research participant perceptions regarding ERP system acceptance. Deductive reasoning enabled me to confirm, refute or comment on the small manufacturing enterprise ERP system acceptance factors explored from literature and field findings. The primary data collected from the sample of small manufacturing enterprises surveyed, are presented in Chapters 4, 5 and 6. A mixed method approach of qualitative and quantitative analysis assisted in obtaining insight regarding small manufacturing enterprises' acceptance of ERP systems. The technique of data triangulation aided in supporting findings gathered from individual sources of data collection.

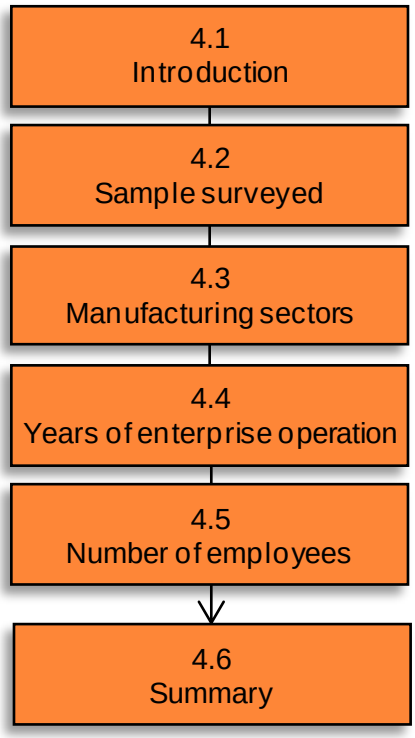
CHAPTER 4:

SAMPLE OF SMALL MANUFACTURING ENTERPRISES SURVEYED

Stage in Dissertation



Map of Chapter 4



4.1 INTRODUCTION

This chapter details the data collection with regard to the sample of small manufacturing enterprises that participated in the survey (Section 4.2). The following data was collected: manufacturing sector in which the manufacturing enterprise operates (Section 4.3), year of establishment of the enterprise (Section 4.4), and the number of employees in the enterprise (Section 4.5). A complete profile of each of the small manufacturing enterprises that participated in the survey is given in Appendix D: Small Manufacturing Enterprise Research Participants. A summary (Section 4.6) highlights the data presented in this chapter.

For reference purposes, the questions applicable to data presented in this chapter are repeated in Table 16. The motivation for asking the various questions was discussed and presented in Section 3.4.3: Question content and wording, Table 12.

Table 16: Section "A" questions asked of a sample of small manufacturing enterprises

Section	Question	Question
4.3	**1**	What would best describe the manufacturing sector in which your small manufacturing enterprise operates?
4.4	**2**	How many years has your enterprise been operating?
4.5	**3**	How many employees do you have?
4.2	**5**	Is your enterprise currently using any ERP system?

4.2 SAMPLE SURVEYED

In order to distinguish small manufacturing enterprises that have experience in using ERP systems from small manufacturing enterprises that do not have experience in using ERP systems, the results were separated based on responses to Question 5: "Is your enterprise currently using any ERP system?"

In the sample, 7 small manufacturing enterprises have experience in using ERP systems. Nine small manufacturing enterprises do not have experience in using ERP systems.

Chapter 5: Experiences of Using ERP Systems, presents data on the acceptance of ERP systems by small manufacturing enterprises that have experience in using ERP systems. Chapter 6: Expectations for Using ERP Systems, presents data on the responses collected from small manufacturing enterprises that have expectations, but that have no experience in using an ERP system. In this chapter (Section 4.3), data related to the manufacturing sectors in which the sample of small manufacturing enterprises operate (experience in using and expectations for using ERP systems), are presented.

4.3 MANUFACTURING SECTORS

The focus of Question 1, "What would best describe the manufacturing sector in which your small manufacturing enterprise operates?" was to investigate if patterns of ERP system acceptance within and between manufacturing sectors could be found. From the 19 manufacturing sectors classified within the manufacturing industry (Section 2.4.2.2: Classification of the South African manufacturing industry, Table 4), representatives from 7 manufacturing sectors responded. In Table 17, a summary of the small manufacturing enterprises surveyed is given. The data indicated in Table 17 is grouped according to experiences in using and expectations for using ERP systems.

Table 17: Sample of manufacturing sectors (n=16)

No.	Sample of Manufacturing Sectors	Experiences of using ERP systems	Expectations for using ERP systems
1.	Food products, beverages and tobacco products		2
2.	Textiles, clothing and leather	1	1
3.	Paper and paper products	1	
4.	Chemicals and chemical products (including pharmaceuticals)	2	
5.	Rubber and plastic products		1
6.	Basic metals, fabricated metal products, machinery and equipment	1	2
7.	Furniture	1	2
8.	Multiple Industries	1	1
	Total	**7**	**9**

Two small manufacturing enterprises worked in multiple industries (furniture and basic metals; fabricated metal products, machinery and equipment).

4.4 YEARS OF ENTERPRISE OPERATION

Question 2: "How many years has your enterprise been operating?" solicited information on the number of years that the enterprise has been operating. The reason for collecting this data was to see if patterns of ERP system acceptance within and between younger or older enterprises could be found. Figure 16 gives a summary of the number of years the small manufacturing enterprises have been in operation.

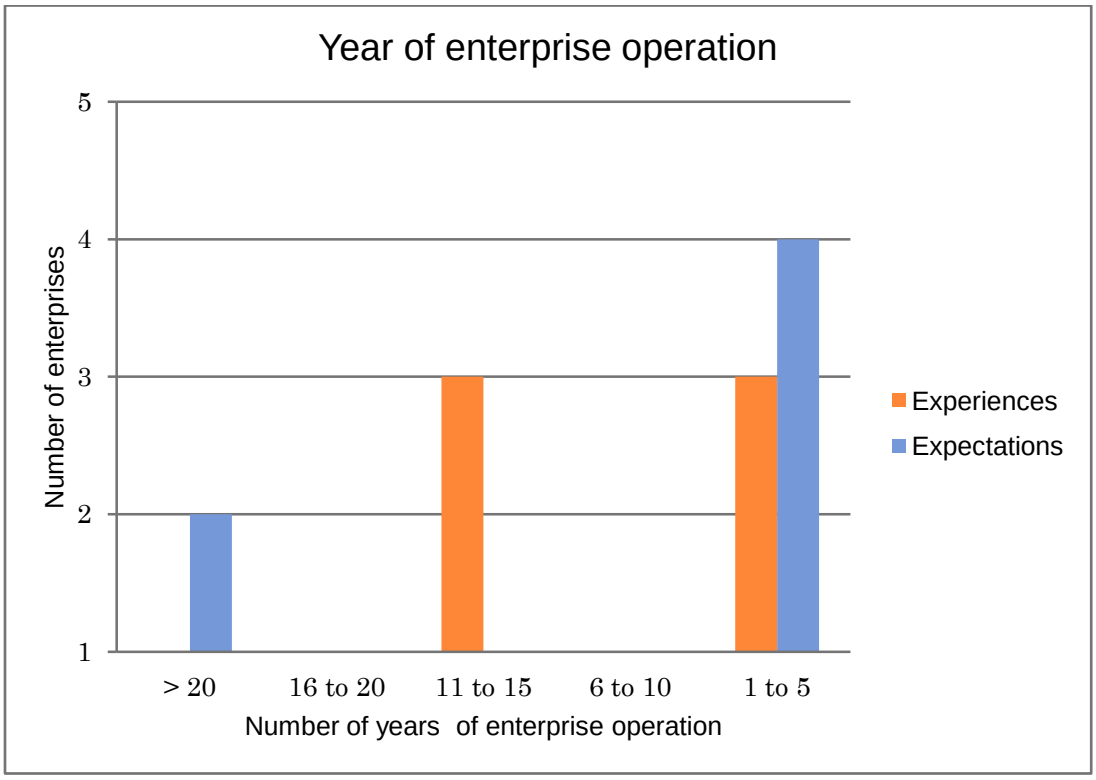


Figure 16: Years of enterprise operation (n=16)

A total of 7 small manufacturing enterprise participants fall within the 1 to 5 year category. Four of the 1 to 5 year enterprises have experience in using ERP systems; 3 have an expectation of using an ERP system. According to the 1 to 5 year enterprise representatives, their enterprises are sustaining operations.

4.5 NUMBER OF EMPLOYEES

In order to determine the size of the enterprise in terms of number of employees, Question 3 was posed: "How many employees do you have?" Figure 17 depicts the number of employees per enterprise in graphic form.

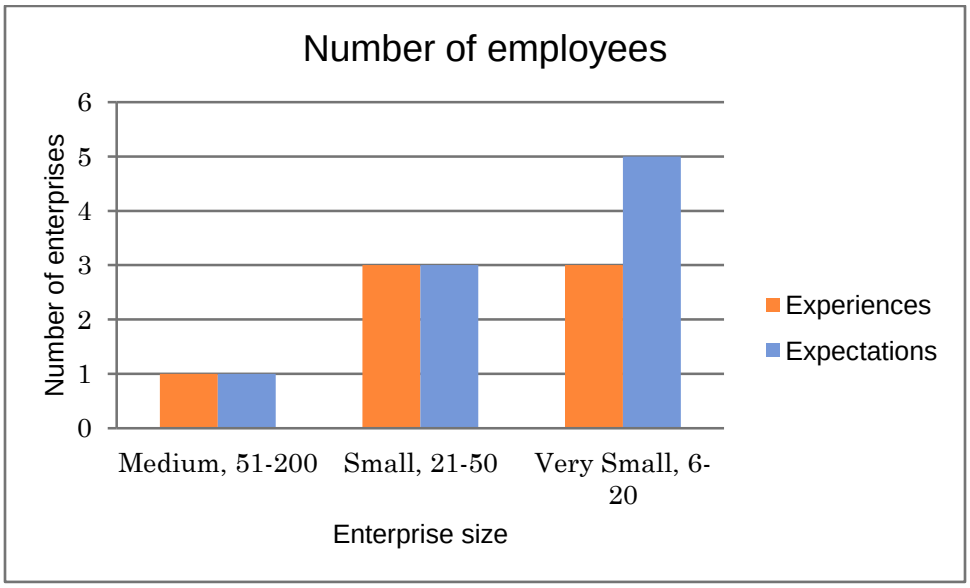


Figure 17: Number of employees (n=16)

Eight participants employ between 6 and 20 people; many are relatively small and the newer manufacturing entities are still acquiring more human resource capacity. Six of the 16 enterprises can be classified as small entities comprising between 21 and 50 employees. Two enterprises can be classified as medium sized enterprises (Section 2.4.1: Defining small manufacturing enterprises, Table 3). It was decided to include the very small and medium enterprise participants in the sample due to the perceived growth potential of these enterprises and their expectations and experiences of using ERP systems.

4.6 SUMMARY

The focus of this chapter was to present a background profile of the small manufacturing enterprises used during the data collection process. The manufacturing sectors included various small manufacturers ranging from food products, textiles, to sectors such as furniture and basic

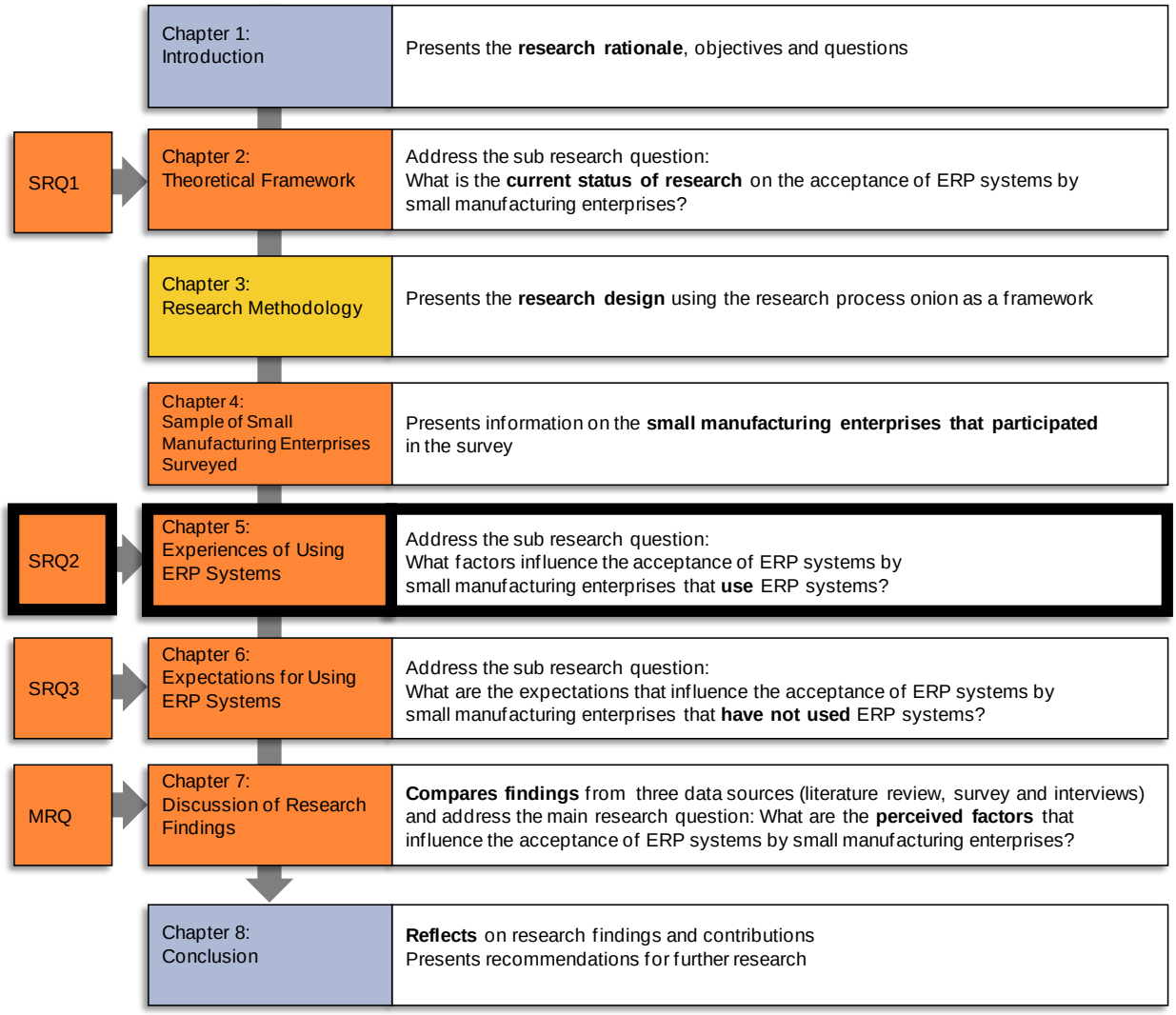
metals. Information was provided on the number of years the enterprise had been in operation. The sample included young enterprises (between 1 and 5 years of operation) and more mature enterprises (over 20 years of operation). The size of the enterprises was also presented, with the number of employees being used as a basis to determine enterprise size.

Most importantly, it was determined that 7 small manufacturers have experience in using ERP systems and 9 do not. Chapter 5: Experience of Using ERP Systems, presents data collected from small manufacturing enterprises that have experience in using ERP systems. Chapter 6: Expectations for Using ERP Systems, presents data collected from small manufacturing enterprises that do not have experience in using ERP systems. An analysis of the results from the small manufacturing enterprises surveyed is compared with findings collected from the literature study (Chapter 2) and from the interviews conducted with two ERP system sales consultants. A reflection of the outcomes of this study is presented in Chapter 8: Conclusion.

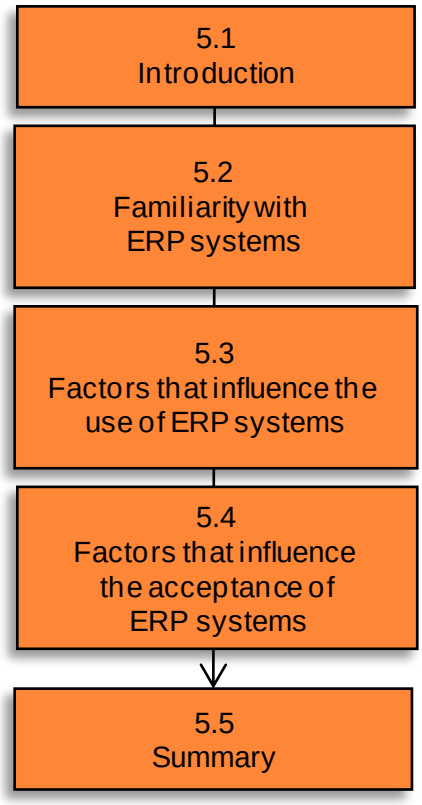
CHAPTER 5:

EXPERIENCES OF USING ERP SYSTEMS

Stage in Dissertation



Map of Chapter 5



5.1 INTRODUCTION

This chapter provides feedback received from enterprises (n=7) that have previously used or are currently using an ERP system. The data presented in this chapter addresses SRQ2:

SRQ2: What factors influence the acceptance of ERP systems by small manufacturing enterprises that have used ERP systems?

Data collected on the familiarity (Section 5.2), factors that influence the use (Section 5.3), and factors that influence the acceptance (Section 5.4) of ERP systems are presented.

For reference purposes, some of the questions applicable to data presented in this chapter are repeated in Table 18. The motivation for asking the various questions was discussed and presented in Section 3.4.3: Question content and wording, Table 12.

Table 18: Questions asked to a sample of small manufacturing enterprises (n=7)

Section	Question	Question
5.2	**4**	Are you familiar with the following ERP systems*? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of ERP systems.
5.3.1	**6**	What sort of ERP system is implemented?
5.3.2	**7**	How would you rate the average computer skill level of users of ERP systems?
5.4.1.2	**8**	Which of the following best describes features* that an ERP system should deliver? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of ERP system features. **- Continued on next page -**

Table 18: Questions asked to a sample of small manufacturing enterprises (n=7) (Continued)

5.4.1.3	**9**	Please rank the following reasons* why you would use an ERP system in order of most important (1) to least important (13). *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of reasons for using an ERP system.
5.4.1.4	**10**	What would you say are the three most important factors* that would influence your decision to purchase an ERP system for your enterprise? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of factors that would influence a decision to purchase an ERP system.
5.4.1.1	**11**	Would brand reputation influence your decision to use an ERP system?

5.2 FAMILIARITY WITH ERP SYSTEMS

In Question 4: "Are you familiar with the following ERP systems?" the small manufacturing enterprises were asked if they were familiar with listed ERP systems (refer to Section 3.4.3: Question content and wording, Table 12, Question 4). Figure 18 summarises familiarity with 3 popular ERP systems by small manufacturing enterprises that have used or are currently using an ERP system.

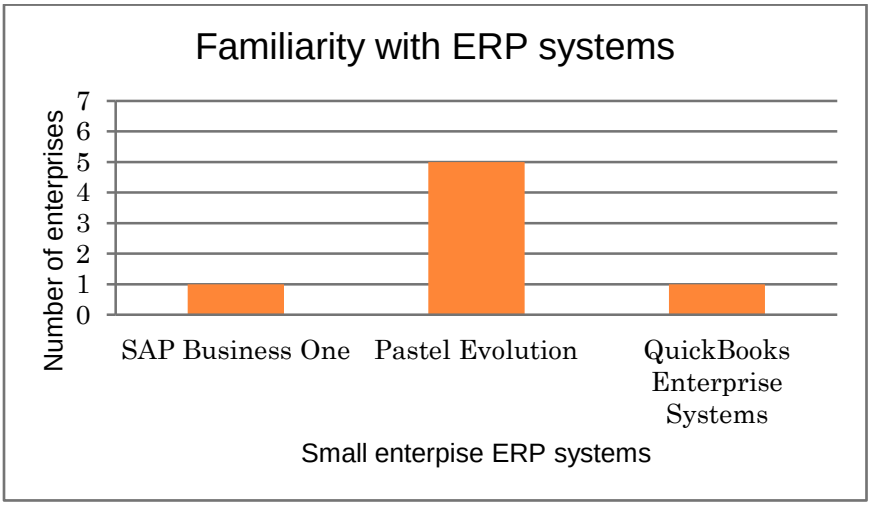


Figure 18: Familiarity with ERP systems (n=7)

One small manufacturing enterprise is familiar with SAP Business One and another with QuickBooks Enterprise Systems. Five small manufacturing enterprises are familiar with Pastel Evolution. It appears that the enterprises surveyed consider accounting systems that are integrated with additional business management functionality as being ERP systems.

5.3 FACTORS THAT INFLUENCE THE USE OF ERP SYSTEMS

This section presents data on factors that influence the use of ERP systems. The ERP systems implemented (Section 5.3.1) could mean that it is used by the small manufacturing enterprises, because that is what the enterprise has access to use. The findings and implications thereof are discussed in Chapter 7, Section 7.3: ERP system acceptance factors. Another factor that may influence the use of ERP systems is computer skills. Small manufacturing enterprises that use ERP systems were asked to rate the perceived level of computer skills (Section 5.3.2.).

5.3.1 ERP systems implemented

The small manufacturing enterprises that use ERP systems were asked Question 6: "What sort of ERP system is implemented?" The reason for collecting this data was to understand the type of ERP systems used by the small manufacturing enterprise. Table 19 lists the responses for this question.

Table 19: ERP systems implemented at small manufacturing enterprises(n=7)

Enterprise	**No.**	**4**	**5**	**6**	**11**	**12**	**13**	**14**
Years of Establishment	**Detail:**	**11-15**	**1 -5**	**1- 5**	**11-15**	**11-15**	**11-15**	**11-15**
CRM/SRM/ Reporting	Type of software	Access, Excel		Access, Excel		Access, Excel	Access, Excel	Access, Excel
	In use since	Since starting		2 years after we started		Can't remember when, a long time ago	Can't remember when	When we started
	No. of users	Management and Admin, 2		Management Admin, 2-3		Admin, 3	Admin, 2	Admin, 2
Manufacturing Execution management	Type of software	MS Project management	P-Lan Manufacturing Execution Management		MS Project Management			
	In use since	2006	2005		2003			
	No. of users	2	2		3			
Accounting and Financial Reporting	Type of software	Pastel Accounting Partner	Pastel Accounting Partner	Pastel My Business Online	QuickBooks Simple Start		QuickBooks pro	
	In use since	One year ago	Last year	Jun-09	Since starting			
	No. of users	2	3	2	2		3	

Five of the 7 enterprises that use an ERP system reported that they use Microsoft Access databases and Microsoft Excel spreadsheets as part of their ERP system implementation, to record information about the customer and supplier related information.

Mrs. Oosthuizen[1], owner and manager of a gift packaging manufacturing enterprise responded: "*Using this specially designed database to save the order history of the customers, it helps us to keep track of how many times a specific customer has ordered from us, so we can negotiate discounts for future orders. It also amazes our customers that we are aware of the number of times they have purchased from us; so it helps everyone.*"

Based on the response to the previous question (Section 5.3.1) on familiarity of ERP systems, accounting systems would appear to be a popular choice by the small manufacturing enterprises in this sample.

Three of the participants reported that they use Pastel Accounting and Financial Reporting systems as it helps them to keep track of their finances better. "*Pastel is easy to use, I learnt to use it in no time and now I trained my office administrator and she is using it well"*, said Mr. Baloyi, owner of a chemical cleaning small manufacturing enterprise.

The main users of these ERP systems are typically owners, managers and/or administrators.

5.3.2 Perceived computer skills of ERP system users

In order to understand the perceived computer skill level and ERP system use from the perspective of the small manufacturing enterprises, the small manufacturing enterprises that use ERP systems were asked Question 7: "What would you rate the average computer skill levels of users of ERP systems?" to rate the computer skill levels of their users of ERP systems. Figure 19 illustrates the responses provided.

1 All names referred to from here on are pseudonyms of small manufacturing enterprises representatives. Participants were informed that their true identity would not be revealed.

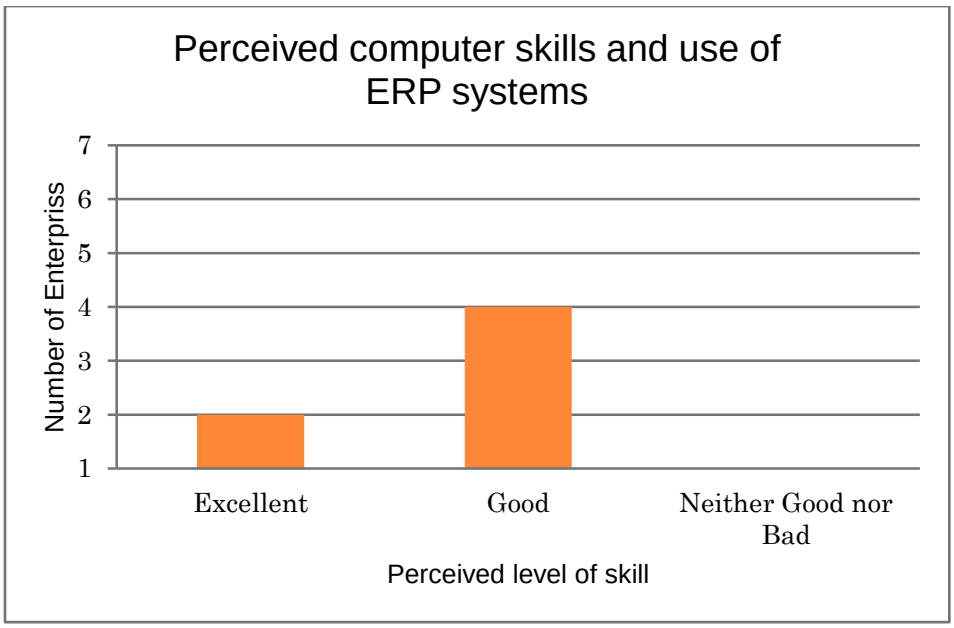


Figure 19: Perceived computer skills of users of ERP systems (n=7)

Four small manufacturing enterprises perceived the computer skills of ERP system users 'Good', whilst 2 reported it as being 'Excellent'. Two enterprises could not report whether the computer skills of their users were good or bad. The responses indicate, to a limited extent, that small manufacturing enterprise that use ERP systems perceive their computer skills as adequate for purposes of supporting the use of ERP systems. Further research to assess computer skill levels and readiness to use ERP systems is recommended.

5.4 FACTORS THAT INFLUENCE THE ACCEPTANCE OF ERP SYSTEMS

In order to address the research questions posed in the study, a question on ERP system acceptance were asked. This section presents data collected on perceived factors of acceptance of ERP systems (Section 5.4.1) and evaluated factors of acceptance of ERP systems (Section 5.4.2).

5.4.1 Perceived factors of acceptance of ERP systems

This section presents data on the brand reputation of ERP systems (Section 5.4.1.1), features that an ERP system should deliver (Section 5.4.1.2), the importance of strategic and business acceptance factors (Section 5.4.1.3), and the two most important acceptance factors (Section 5.4.1.4) perceived.

5.4.1.1 ERP system brand reputation

Small manufacturing enterprises were asked whether branding influences the decision to accept an ERP system, i.e. Question 11: "Would brand reputation influence your decision to use an ERP system?" to support or refute this common belief. Figure 20 depicts the enterprises in favour of ERP system brand reputation and those that are not as concerned about branding.

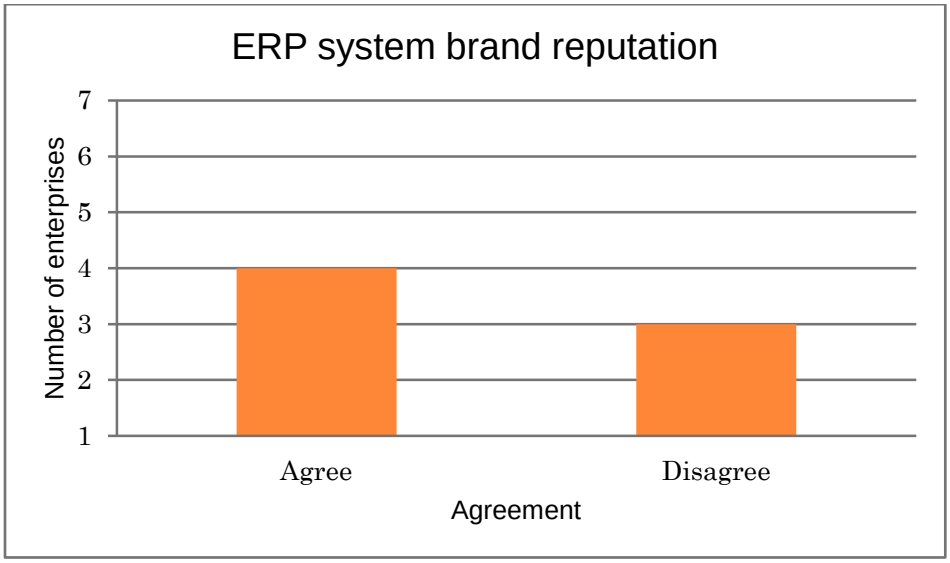


Figure 20: ERP system brand reputation (n=7)

The results reveal that branding is important to a majority of the sample of small manufacturing enterprises surveyed.

5.4.1.2 Features that an ERP system should deliver

ERP systems are made of a number of components integrated to work efficiently and effectively with one other. The components of a manufacturing ERP system are discussed in Section 2.3.3: Components of ERP systems. The small manufacturing enterprises were asked to select features (referring to components) that ERP systems should deliver, Question 8: "Which of the following best describes features that an ERP system should deliver?" The reason for collecting this data was to determine the typical components an ERP system should provide to a small manufacturing enterprise; this, from the perspective of a small manufacturing enterprise that currently makes use of ERP systems. Figure 21 depicts the typical features required by small manufacturing enterprises that use ERP systems.

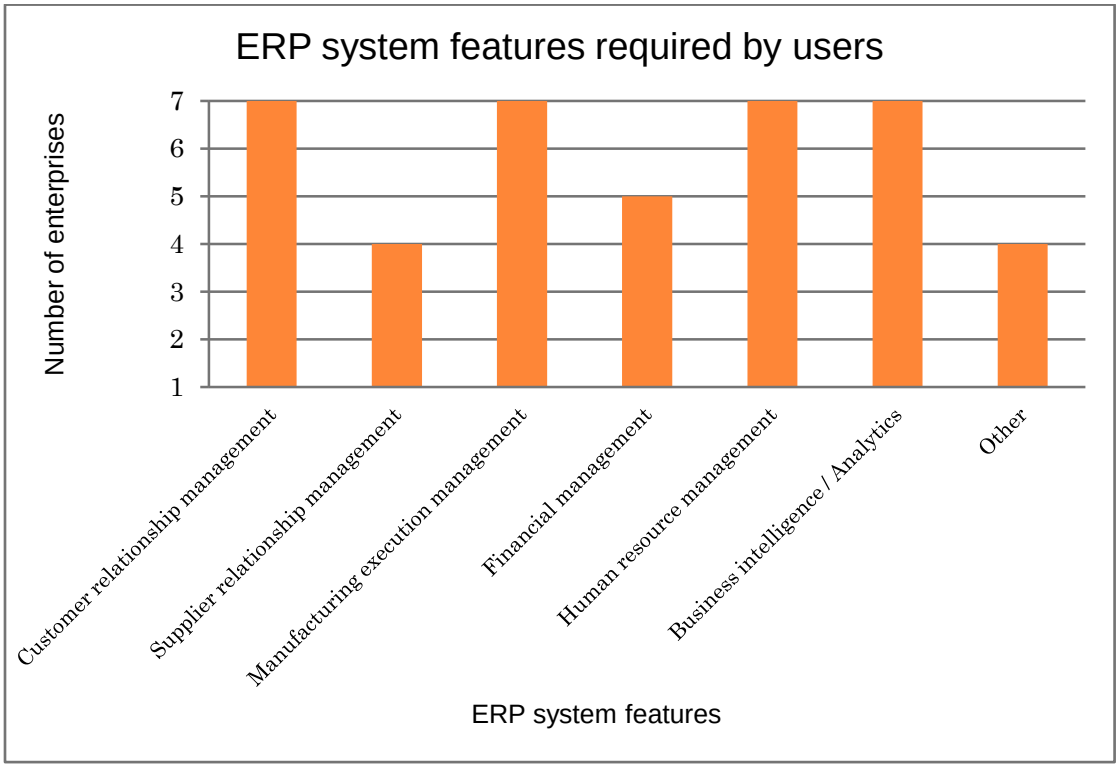


Figure 21: ERP system features required by users (n=7)

Typical features that an ERP system should support include client relationship management (7 enterprises), supplier relationship management (4 enterprises), manufacturing execution management (7 enterprises), financial management (5 enterprises), human resource management (7 enterprises), and business intelligence/ analytical reporting (7 enterprises).

Four enterprises required 'Other' important features, including: stock management (2 enterprises), product catalogue management (1 enterprise) and price history system (1 enterprise). The sample of small manufacturing enterprises that use ERP systems know what functionality they require. This could be because the enterprises understand their business needs and/or understand the functionality of the ERP system that they currently use.

5.4.1.3 Importance of strategic and business acceptance factors

In order to determine which strategic and business factors are perceived as more important compare to other strategic and business factors, the small manufacturing enterprises were asked Question 9: "Please rank the following reasons on why you would use an ERP system in order of

most important (1) to least important (13)". Table 20 lists the results of the ranking of strategic and business acceptance factors in order of most important to least important.

Table 20: Ranking of importance of strategic and business acceptance factors (n=7)

Acceptance factor	**Rank**
Enables business growth and strategic alignment	1
Better business planning and consolidation	2
Advance business operations	3
Manage complexity and cost efficiently adapt to changes	4
Improve stakeholder relationship and trust	5
Promote transparent governance and improve operational efficiency	6
Timely analytical-supported decision-making ability	7
Manage cash, liquidity and financial risk better	8
Promote transparent governance and improve operational efficiency	9
Cost saving through optimization of IT (information technology)	9
Manage the workforce through rapid change	10
Promote transparent governance and improve operational efficiency	11
Competition in industry	11
Manage the workforce through rapid change	12
Industry necessitates the use of an ERP system	12
Follow industry best practices	N/A

Using the statistical method of determining the mode, the largest number of responses for a particular acceptance factor was determined. Some rankings were clear, whereas other strategic and business acceptance factors had duplicate rankings, as indicated in Table 21:

Table 21: Duplicate ranking of strategic and business acceptance factors (n=7)

Individual rank number 6: **Promote transparent governance and improve operational efficiency** *Joint rank number 9:* **Promote transparent governance and improve operational efficiency** Cost saving through optimisation of IT (information technology) *Joint rank number 11:* **Promote transparent governance and improve operational efficiency** Competition in industry
Individual rank number 10: **Manage the workforce through rapid change** *Joint rank number 12:* **Manage the workforce through rapid change** Industry necessitates the use of an ERP system

The most important acceptance factor reported by small manufacturing enterprises that use ERP systems is for an ERP system to 'enable business growth and strategic alignment'. The least important, ranked at 12, is jointly shared by the acceptance factors: 'manage the workforce through rapid change'; and 'industry necessitates the use of an ERP system.' A ranking for the acceptance factor: 'follow industry best practices' could not be determined due to the varying responses received.

A preliminary analysis of these rankings indicates that small manufacturing enterprises that use ERP systems accept ERP systems on the basis of strengthening the strategic and business functioning of their enterprises. Further analysis and discussion on the ranking of strategic and business acceptance factors is presented in Chapter 7, Section 7.3: ERP system acceptance factors.

5.4.1.4 Top two most important ERP system acceptance factors

The small manufacturing enterprises were asked to select the 3 most important acceptance factors that would influence the enterprise's decision to purchase an ERP system, Question 10: "What would you say are the three most important factors that would influence your decision to purchase an ERP system for your enterprise? The enterprises were told that these factors that do not affect the working of the system, but are important concerning the purchasing and use of the ERP system. The reason for collecting this data was to determine the 3 most important ERP system acceptance factors that a small manufacturing enterprise takes into account when purchasing and using an ERP system, from the perspective of small manufacturing enterprises that use ERP systems. Table 22, however, lists the top 2 ERP system acceptance factors.

Table 22: Ranking of the top two most important ERP system acceptance factors (n=7)

Acceptance factor	Rank
Provision of functionality on-demand with the ability to "switch on and switch off" functionality'	1
Integration with other business systems	2

The mode was calculated to determine the largest number of responses for a particular acceptance factor. The most important acceptance factor, coded as 1, is: 'provision of functionality on-demand with the ability to "switch on and switch off" functionality'. The second most important ERP acceptance factor, coded as 2, is: 'integration with other business systems'. The third most important factor could not be determined because of the varying responses collected. It appears that the small manufacturing enterprises in this sample agree in terms of the provision of on-demand functionality and integration of different business systems.

5.4.2 Evaluated factors of acceptance of ERP systems

The responses received for Section "B" (completed only by small manufacturing enterprises that currently use an ERP system) of the questionnaire from the 7 small manufacturing enterprises

that participated in this part of study are presented in this section. Twelve statements were posed in this section. The participants were allowed to select only 1 of the agreement choices. These statements were based on statements pertaining to original determinants used to estimate the UTAUT model [Venkatesh, et al., 2003]. Table 23 lists the statements that were used.

Table 23: Statements assessing the experience of using ERP systems

Statement Code	**Performance expectancy**
B_S1	Using our ERP system enables us to accomplish tasks more quickly.
B_S2	Using an ERP system increases our productivity.
	Effort expectancy
B_S3	The interface of an ERP system should be clear and understandable.
B_S4	Learning to use our ERP system is easy for us.
	Social influence
B_S5	People who influence our behaviour think we should use an ERP system.
B_S6	People who are important to us think we should use an ERP system.
B_S7	The management of our enterprise has been helpful in the use of our ERP system.
B_S8	In general, our enterprise has supported the use of an ERP system.
	Facilitating conditions
B_S9	We have the resources necessary to use an ERP system.
B_S10	We have the knowledge necessary to use our ERP system.
B_S11	Our ERP system is not compatible with other systems we use.
B_S12	A specific person (or group) is available for assistance with our ERP system's difficulties.

Each statement was assigned a corresponding statement code to indicate which section of the questionnaire the statement belonged to. The statement code was used for coding purposes when the data was captured.

5.4.2.1 Performance expectancy

Figure 22 illustrates the actual and calculated average of responses to the 2 statements posed to assess performance expectancy.

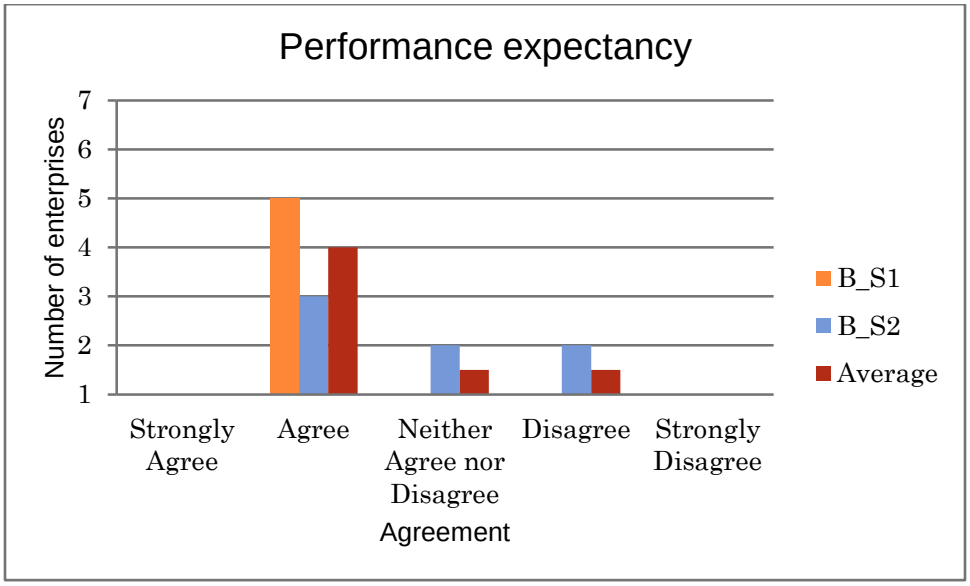


Figure 22: Performance expectancy (n=7)

The data from 7 enterprises using an ERP system show that the small manufacturing enterprises agree that '*using our ERP system enables us to accomplish tasks more quickly*' and that '*using an ERP system increases our productivity*'. Five enterprises agree with statement B_S1 and 3 enterprises agree with statement B_S2.

5.4.2.2 Effort expectancy

Figure 23 illustrates the actual and calculated average of responses to the 2 statements used to assess effort expectancy.

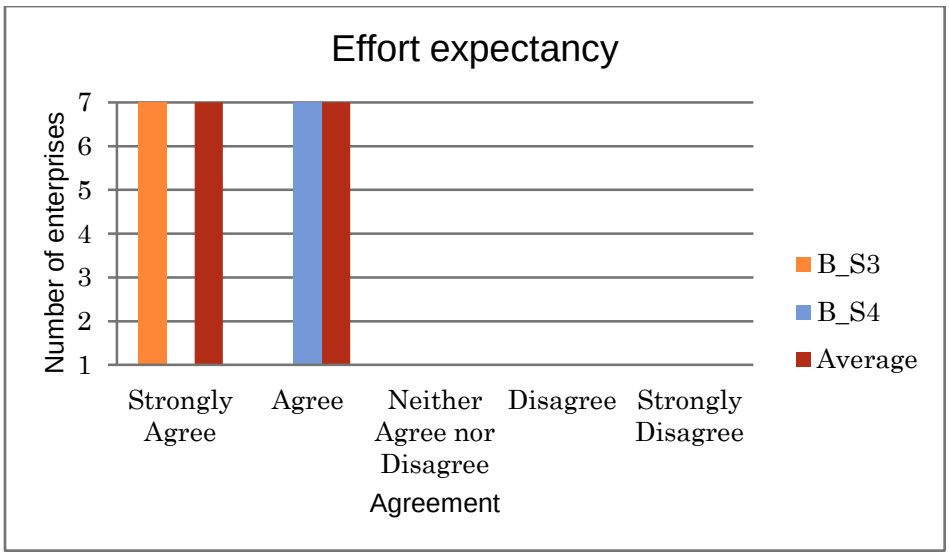


Figure 23: Effort expectancy (n=7)

The 7 enterprises that use an ERP system all strongly agree that '*the interface of an ERP system should be clear and understandable*'; furthermore all 7 agree that '*learning to use our ERP system is easy for us*'.

5.4.2.3 Social influence

Figure 24 illustrates the actual and calculated average of responses to the 4 statements used to assess social influence.

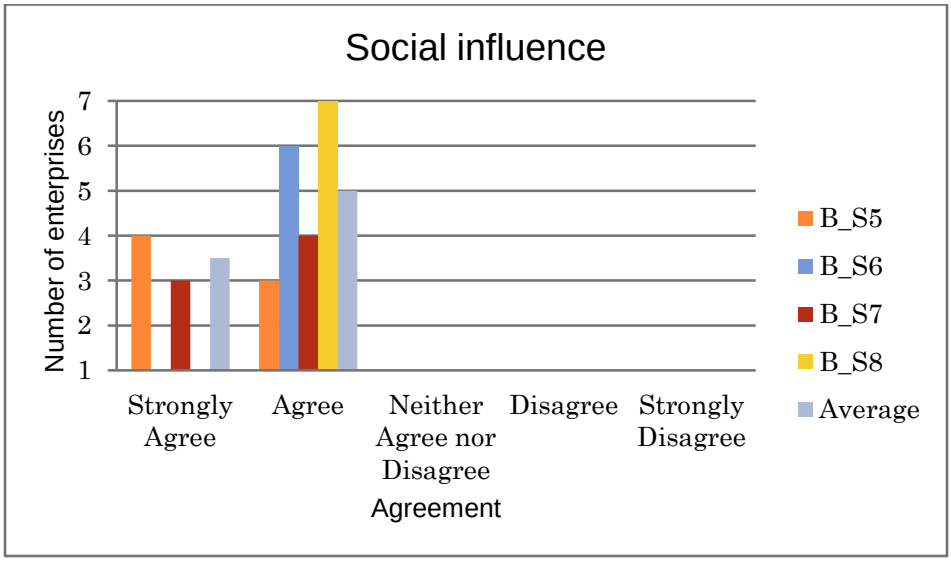


Figure 24: Social influence (n=7)

Four respondents strongly agreed with this statement: '*people who influence our behaviour think we should use an ERP system*' and 3 small manufacturing enterprises agreed with the statement.

Six enterprises agreed with the supporting statement put forward: '*people who are important to us think we should use an ERP system*'. One small manufacturing enterprise was undecided as to whether it agrees or disagrees with statement B_S6.

When asked whether '*the management of [their] enterprise has been helpful in the use of [their] ERP system*', 3 enterprises strongly agreed with the statement and 4 enterprises agreed.

There is agreement from the 7 small manufacturing enterprises that '*in general, our enterprise has supported the use of an ERP system*'.

5.4.2.4 Facilitating conditions

Figure 25 illustrates the actual and calculated average of responses to the 4 statements used to assess facilitating conditions.

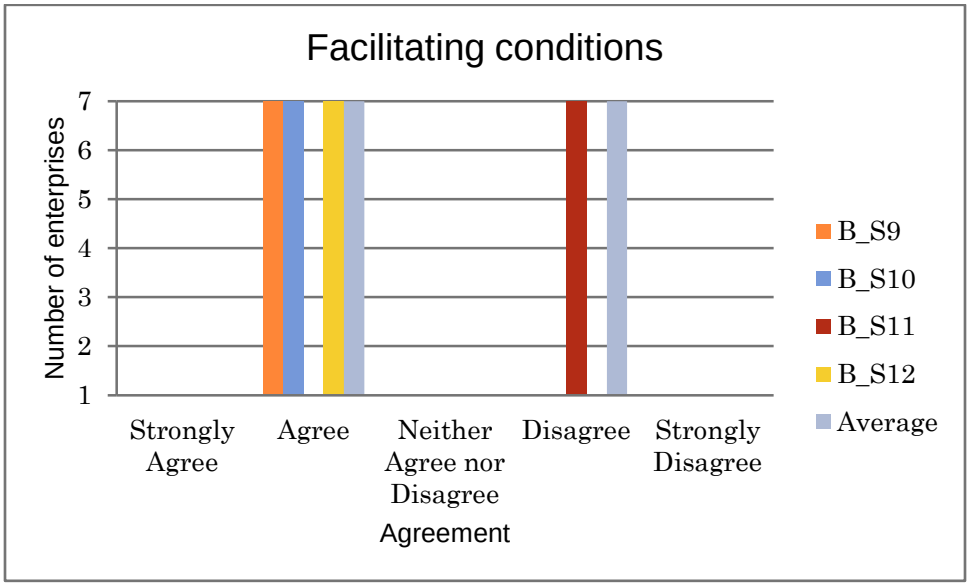


Figure 25: Facilitating conditions (n=7)

When asked to comment on the statements: '*we have the resources necessary to use an ERP system*', and '*we have the knowledge necessary to use our ERP system,*' all 7 small manufacturing enterprises that use an ERP system agreed with the statements.

There is disagreement from all 7 small manufacturing enterprises that '*our ERP system is not compatible with other systems we use*'. This implies that ERP systems are compatible with other systems used by small manufacturing enterprises in the sample.

The final statement asked small manufacturing enterprises if '*a specific person (or group) is available for assistance with our ERP system's difficulties*'. All 7 small manufacturing enterprises that use an ERP system agreed with the statement.

5.5 SUMMARY

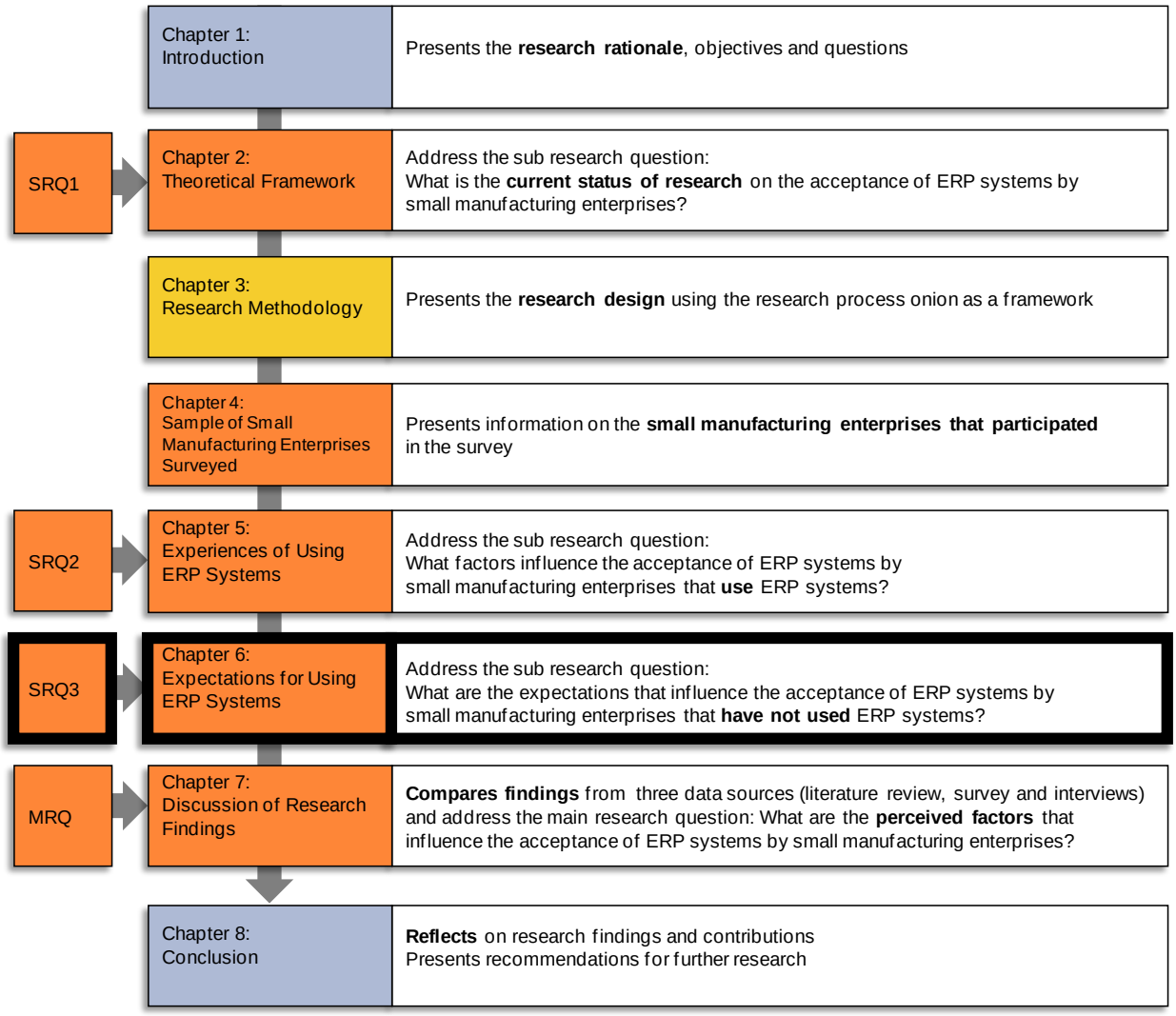
This chapter presented data collected from 7 small manufacturing enterprises that already use ERP systems. The preliminary analysis indicates that small manufacturing enterprises that use ERP systems would accept and use an ERP system if it supports the growth and strategic development of their enterprise. Day-to-day business operations should also be supported through the use of ERP systems. There is also an indication that small manufacturing enterprises that use ERP systems expect ERP systems to aid in fulfilling business activities with minimal effort. The enterprises want to use functionality on-demand, when required. The purchase of an ERP system may or may not be influenced by brand power. These small manufacturing enterprises believe they are ready to make use of ERP systems, if ERP systems facilitate their needs.

Chapter 6: Expectations for Using ERP Systems, presents data collected from small manufacturing enterprises that do not use ERP systems, but that intend to purchase and use ERP systems.

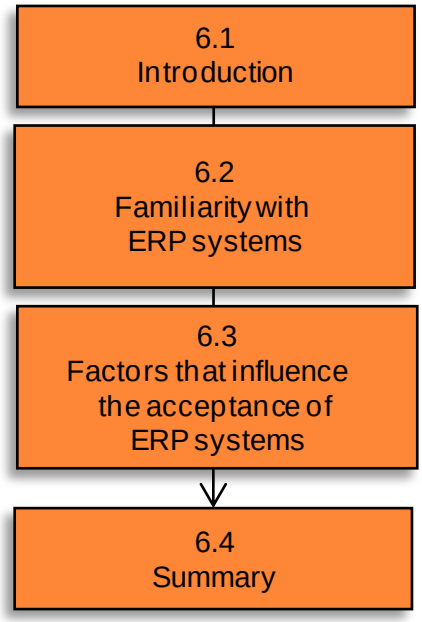
CHAPTER 6:

EXPECTATIONS FOR USING ERP SYSTEMS

Stage in Dissertation



Map of Chapter 6



6.1 INTRODUCTION

In this chapter, the data collected from enterprises (n=9) that have not used ERP systems are presented. The data presented in this chapter addresses SRQ3:

SRQ3: What are the expectations that influence the acceptance of ERP systems by small manufacturing enterprises that have not used ERP systems?

Data collected on the familiarity (Section 6.2) and factors that influence the acceptance (Section 6.3) of ERP systems are presented.

For reference purposes, some of the questions applicable to data presented in this chapter are repeated in Table 24. The motivation for asking the various questions was discussed and presented in Section 3.4.3: Question content and wording, Table 12.

Table 24: Questions asked to a sample of small manufacturing enterprises (n=9)

Section	Question	Question
6.2	**4**	Are you familiar with the following ERP systems*? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of ERP systems.
6.3.1.2	**8**	Which of the following best describes features* that an ERP system should deliver? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of ERP system features.
6.3.1.3	**9**	Please rank the following reasons* why you would use an ERP system, in order of most important (1) to least important (13). *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of reasons for using an ERP system. **- Continued on next page -**

Table 24: Questions asked to a sample of small manufacturing enterprises (n=9) (Continued)

6.3.1.4	**10**	What would you say are the three most important factors* that would influence your decision to purchase an ERP system for your enterprise? *Refer to Section 3.4.3: Question content and wording, Table 12 for the list of factors that would influence a decision to purchase an ERP system.
6.3.1.1	**11**	Would brand reputation influence your decision to use an ERP system?

6.2 FAMILIARITY WITH ERP SYSTEMS

The small manufacturing enterprises were asked if they were familiar with listed ERP systems Question 4: "Are you familiar with the following ERP systems?" The reason for collecting this data was to understand if small manufacturing enterprises were familiar with commercially available ERP systems. Figure 26 indicates familiarity with ERP systems by small manufacturing enterprises that have not used ERP systems.

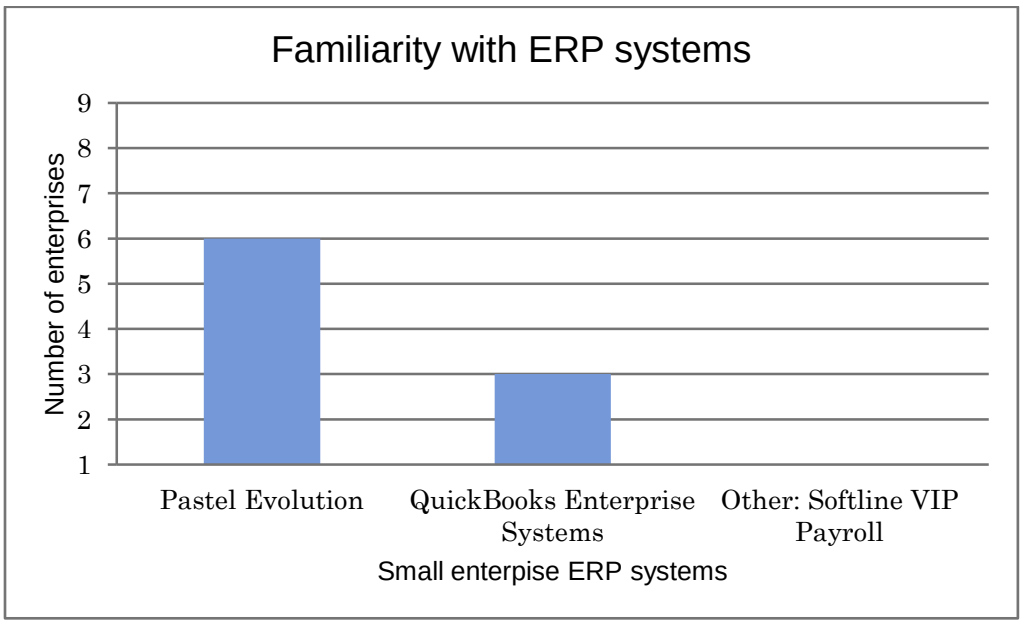


Figure 26: Familiarity with ERP systems (n=9)

Six small manufacturing enterprises are familiar with Pastel Evolution. Three small manufacturing enterprises are familiar with QuickBooks Enterprise Systems. As with small manufacturing enterprises that currently use ERP systems, the data indicates that account systems that are integrated with additional business management functionality are considered to be ERP systems by the enterprises surveyed in this sample sub-set.

6.3 FACTORS THAT INFLUENCE THE ACCEPTANCE OF ERP SYSTEMS

In order to address the research questions posed in the study, questions on ERP system acceptance were asked. This section presents data collected regarding perceived factors of acceptance of ERP systems (Section 6.3.1) and evaluated factors of acceptance of ERP systems (Section 6.3.2).

6.3.1 Perceived factors of acceptance of ERP systems

This section presents data on the brand reputation of ERP systems (Section 6.3.1.1), features that an ERP system should deliver (Section 6.3.1.2), the importance of strategic and business acceptance factors (Section 5.3.1.3), and the three most important acceptance factors (Section 6.3.1.4) perceived.

6.3.1.1 ERP system brand reputation

The small manufacturing enterprises were asked if brand reputation would influence the decision to purchase an ERP system, Question 11: "Would brand reputation influence your decision to use an ERP system?" The reason for collecting this data was to understand if branding could influence acceptance of ERP systems. Figure 27 depicts the enterprises in favour of ERP system brand reputation and those that are not as concerned about ERP system brand reputation.

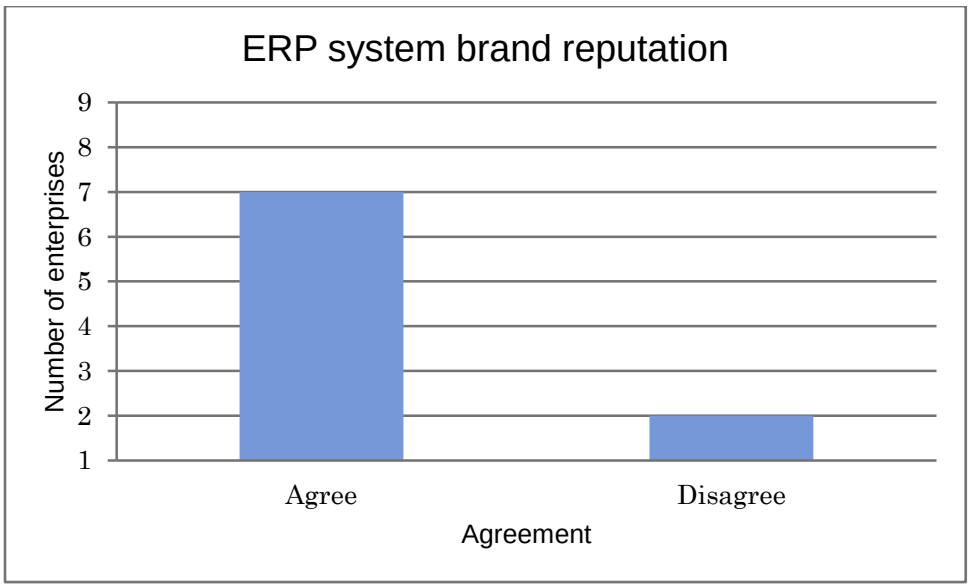


Figure 27: ERP system brand reputation (n=9)

Seven enterprises agreed that brand reputation would affect their decision to purchase and use an ERP system, whilst 2 enterprises said they disagree.

"*We are caught up in so much branding. We sometimes forget that other brands have quality too. I want an ERP that works for me and my enterprise*", responded Mrs Portia.

In contrast, Mr Kwando firmly believes that "*a good brand is recognised; it means people are using it. It must be working right. So if so many other customers are happy with it, let me also try it and then if it does not work I will speak out and say so. I want a refund if it's rubbish* [laughs]."

Branding is important to a majority of the sample of small manufacturing enterprises surveyed.

6.3.1.2 Features that an ERP system should deliver

In order to determine the typical features (referring to components) that an ERP system should provide to a small manufacturing enterprise, the enterprises were asked to select features that ERP systems should deliver, Question 8: "Which of the following best describes features that an ERP system should deliver?" Figure 28 depicts the typical features required by small manufacturing enterprises that use ERP systems.

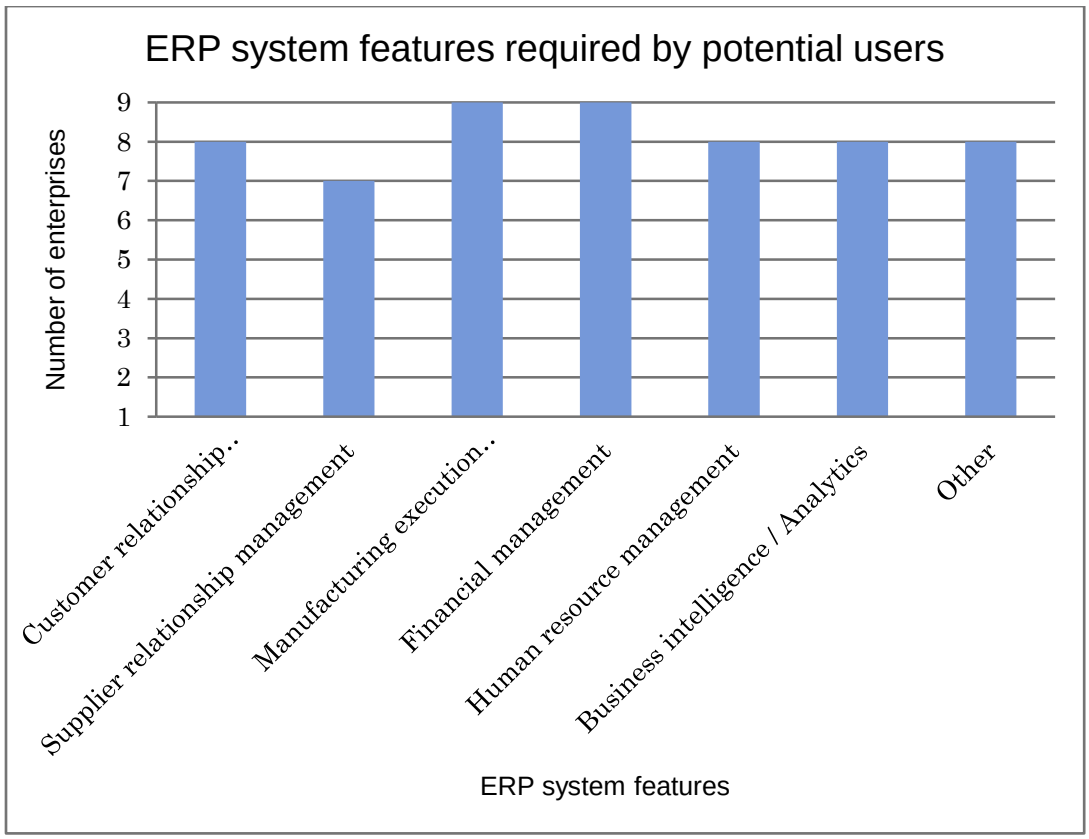


Figure 28: ERP system features required by potential users (n=9)

Typical features that an ERP system should support includes: client relationship management (8 enterprises), supplier relationship management (7 enterprises), manufacturing execution management (9 enterprises), financial management (9 enterprises), human resource management (8 enterprises), and business intelligence/analytical reporting (8 enterprises).

Eight enterprises noted 'Other' important features that ERP systems should support. The 'Other' important features can be summarised as follows: stock management (2 enterprises); link to other systems such as Microsoft Office, Microsoft Word documents, Excel spreadsheets (6 enterprises); link to email programs (2 enterprises).

The ERP system must not only be functionally effective from a business perspective but also be: "*easy to use, simple, quick, not many screens to go through, no fancy buttons and hardly used tools*". Additional responses from various participants included: '*It must fit my enterprise ... be easy enough to train the relevant workers to use. I also want to combine design tools with the*

systems. I want to link images of my furniture design to my customer record to know what furniture designs my customer likes.'

These small manufacturing enterprises that do not use ERP systems are vocal on what functionality is required. This could be because they understand their current and future business needs.

6.3.1.3 Importance of strategic and business acceptance factors

In order to determine which strategic and business factors are perceived as more important compared to other strategic and business factors, the small manufacturing enterprises that do not use ERP systems were asked Question 9: "Please rank the following reasons on why you would use an ERP system in order of most important (1) to least important (13)". Table 25 lists the results of the ranking of strategic and business acceptance factors in order of most important to least important.

Table 25: Ranking of importance of strategic and business acceptance factors (n=9)

Acceptance factor	**Rank**
Advance business operations	1
Better business planning and consolidation	2
Enables business growth and strategic alignment	3
Promote transparent governance and improve operational efficiency	4
Cost saving through optimisation of IT (information technology)	5
Timely analytical-supported decision-making ability	5
Manage complexity and cost efficiently adapt to changes	6
Manage cash, liquidity and financial risk better	7
Timely analytical-supported decision-making ability	8
Improve stakeholder relationship and trust	9
Timely analytical-supported decision-making ability	9
Industry necessitates the use of an ERP system	10
Competition in industry	11
Manage the workforce through rapid change	12
Follow industry best practices	N/A

Using the statistical method of determining the mode, the largest number of responses for a particular acceptance factor was determined. Some rankings were clear, where as other strategic and business acceptance factors had duplicate rankings indicated in Table 26:

Table 26: Duplicate ranking of strategic and business acceptance factors (n=9)

Joint rank number 5: **Timely analytical-supported decision-making ability** Cost saving through optimisation of IT (information technology)
Individual rank number 8: **Timely analytical-supported decision-making ability**
Joint rank number 9: **Timely analytical-supported decision-making ability** Improve stakeholder relationship and trust

The most important acceptance factor for small manufacturing enterprises that do not use ERP systems is for ERP systems to 'advance business operations'; the least important is: 'manage the workforce through rapid change'.

As in the case of the small manufacturing enterprises that use ERP systems, a ranking for the acceptance factor: 'follow industry best practices' could not be determined due to the varying responses collected. Here is the view of one enterprise on industry best practice: "*I have worked within a large organisation following strict procedures that are not flexible. My business is still young to me. I want to follow good practice, but not what is seen as best. I want the system to be used as a guide telling us what we have to do, but giving us room to do our own unique processes that are not the standard way of doing things 'best'*" (Mr. Nkhosi, manager of a small bakery and café).

A preliminary analysis of these rankings indicates that small manufacturing enterprises that do not use ERP systems would accept ERP systems on the basis of promoting business operations

and growth. Further analysis and discussion on the ranking of strategic and business acceptance factors are presented in Chapter 7, Section 7.3: ERP system acceptance factors.

6.3.1.4 Top three most important ERP system acceptance factors

In order to determine the 3 most important ERP system acceptance factors that a small manufacturing enterprise would take into account when purchasing and using an ERP system, small manufacturing enterprises were asked Question 10: "What would you say are the three most important factors that would influence your decision to purchase an ERP system for your enterprise?" As in the case of the first group of small manufacturing enterprises, the enterprises were told that these factors do not affect the working of the system, but are important concerns when purchasing and using the ERP system. Table 27 lists the results of the top 3 most important ERP system acceptance factors.

Table 27: Ranking of the top three most important ERP system acceptance factors (n=9)

Acceptance factor	Rank
Provision of functionality on-demand with the ability to "switch on and switch off" functionality'	1
Accessibility: anytime, anywhere, including mobile and web accessibility	1
Long term investment sustainability	1
Low total cost of ownership – maintenance, upgrades, consultation, training, etc	2
User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done	3

The mode was calculated to determine the largest number of responses for a particular acceptance factor. The top most important acceptance factor is common to three acceptance factors, namely:

- Provision of functionality on-demand with the ability to "switch on and switch off" functionality.
- Accessibility: anytime, anywhere, including mobile and web accessibility.
- Long term investment sustainability.

The second most important acceptance factor is: 'Low total cost of ownership – maintenance, upgrades, consultation, training, etc.' Responses from 4 of the enterprises indicate the importance of a low total cost of an ERP system. The four responses are presented in Table 28.

Table 28: Responses on low cost of ERP systems (n=4):

1. "There are many systems that can do what we need; the sales people always come to us, but **what fails to grab my attention is the cost**, the user licenses."
2. "**Cost is always an issue;** that's why I'm planning and saving for it."
3. "It's **too expensive for a young enterprise like mine.** All the additions come out to quite a package."
4. "Getting the systems is one thing; training and maintenance and upgrades are another … **must make it lower for us small enterprises**."

The third most important acceptance factor is: 'user experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done.'

It appears that the small manufacturing enterprises in this sample also reach consensus in terms of the provision of on-demand functionality. However, accessibility, investment sustainability, cost and user experience was amongst the top acceptance factors considered by these enterprises.

6.3.2 Evaluated factors of acceptance of ERP systems

The responses received for Section "C" of the questionnaire (completed only by small manufacturing enterprises that do not use ERP systems) from the 9 small manufacturing enterprises that participated in this part of study are presented in this section. Ten statements were posed in this section. The participants were allowed to select only 1 of the agreement choices. These statements were based on statements pertaining to original determinants used to estimate the UTAUT model [Venkatesh, et al., 2003]. Table 29 lists the statements that were posed to the small manufacturing enterprises that do not use ERP systems.

Table 29: Statements used to assess the expectations for using ERP systems

Statement Code	
	Performance expectancy
C_S1	We may find an ERP system useful in our enterprise.
C_S2	If we use an ERP system, it may increase our chances of becoming more profitable.
	Effort expectancy
C_S3	The interface of an ERP system should be clear and understandable.
C_S4	It should be easy for us to become skilled at using an ERP system.
C_S5	We should find an ERP system easy to use.
	Social influence
C_S6	People who influence our behaviour think we should use an ERP system.
C_S7	People who are important to us think we should use an ERP system.
	Facilitating conditions
C_S8	We have the resources necessary to use an ERP system.
C_S9	We have the knowledge necessary to use an ERP system.
C_S10	ERP systems may not be compatible with other systems we use.

A corresponding statement code was assigned to each statement to indicate which section of the questionnaire the statement belonged to. The statement code was used for coding purposes when the data was captured.

6.3.2.1 Performance expectancy

Figure 29 illustrates the actual and calculated average of responses to the 2 statements used to assess performance expectancy.

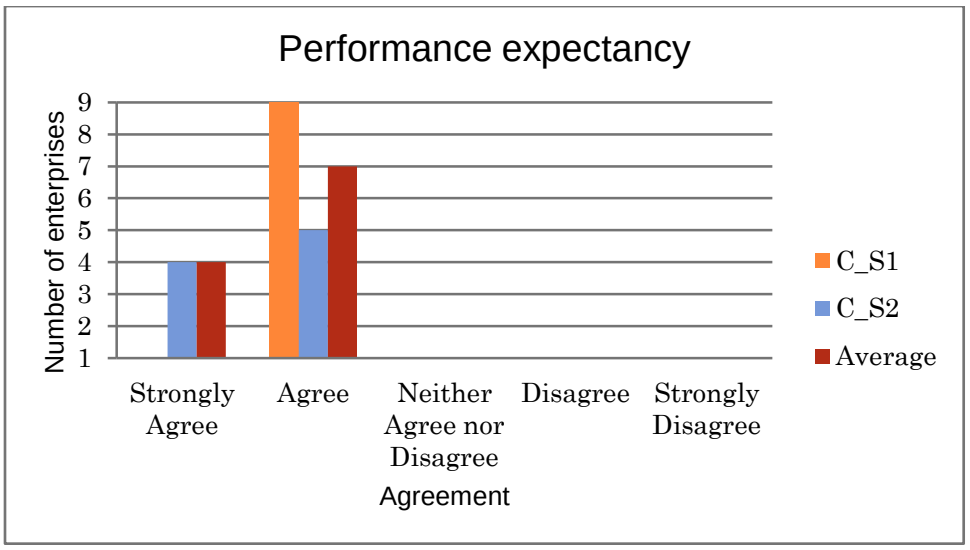


Figure 29: Performance expectancy (n=9)

Results from the 9 enterprises with no experience of using ERP systems reveal that the small manufacturing enterprises agree that '*we may find an ERP system useful in our enterprise*' and that '*if we use an ERP system it may increase our chances of becoming more profitable*'. Nine enterprises agree with statement C_S1 and 4 enterprises strongly agree with statement C_S2.

6.3.2.2 Effort expectancy

Figure 30 illustrates the actual and calculated average of responses to the 2 statements used to assess effort expectancy.

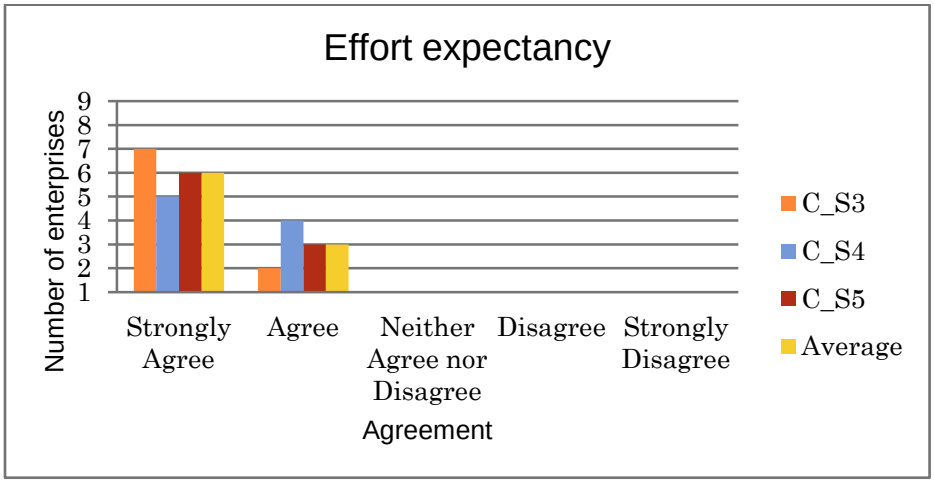


Figure 30: Effort expectancy (n=9)

Seven small manufacturing enterprises with no experience of using ERP systems strongly agree that '*the interface of an ERP system should be clear and understandable*'; 2 agree with the statement. Five enterprises strongly agree and 4 agree that '*it should be easy for us to become skilled at using an ERP system*'.

When asked to rate their agreement with the statement: '*we should find an ERP system easy to use*', it was found that 6 enterprises strongly agree with the statement and 3 enterprises agree.

6.3.2.3 Social influence

Figure 31 illustrates the actual and calculated average of responses to the 2 statements used to assess social influence.

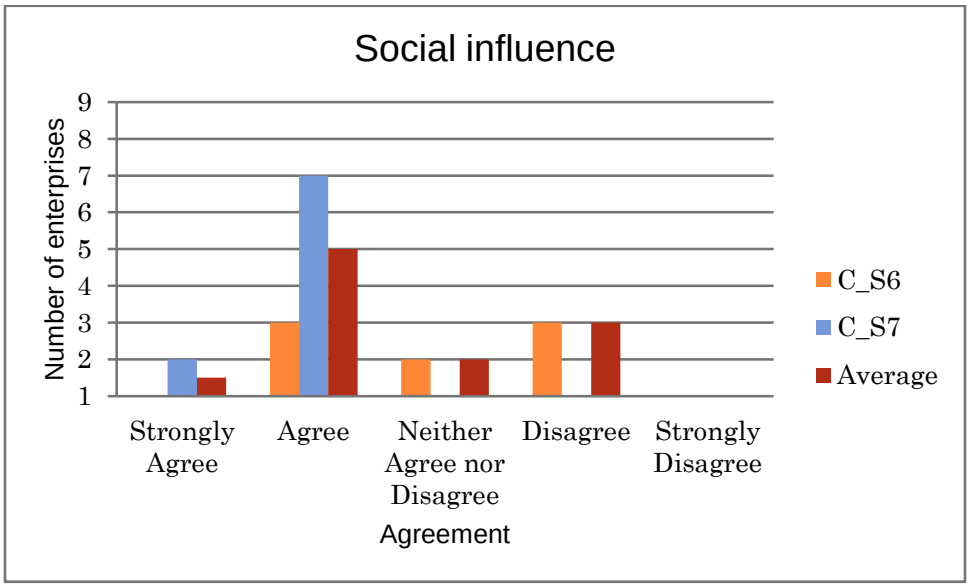


Figure 31: Social influence (n=9)

The 9 small manufacturing enterprises that have no experience in using ERP systems hold varying views regarding the statement: '*people who influence our behaviour think we should use an ERP system*'. Three enterprises agree and disagree with the statement. Two enterprises neither disagree nor agree with the statement; and only one enterprise strongly agrees with the statement.

In terms of the statement: '*people who are important to us think we should use an ERP system*', 7 enterprises agree and 2 enterprises strongly agree with the statement.

6.3.2.4 Facilitating conditions

Figure 32 illustrates the actual and calculated average of responses to the 3 statements used to assess facilitating conditions.

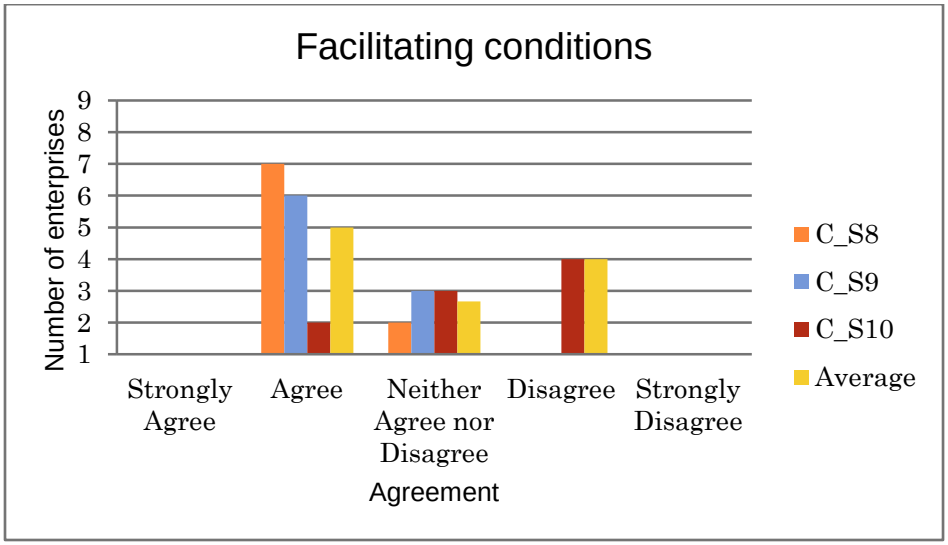


Figure 32: Facilitating conditions (n=9)

Seven small manufacturing enterprises agree and 2 enterprises neither agreed nor disagreed with the statement '*we have the resources necessary to use an ERP system*'. Three of the small manufacturing enterprises who responded to statement C_S6 are within the establishment period of one to five years.

Six small manufacturing enterprises agreed that '*we have the knowledge necessary to use an ERP system*', whilst 3 enterprises could neither disagree nor agree with the statement. One of the small manufacturing enterprises that agreed, remarked, "*When we get a new system in place, I would like everyone working in the office to get training - even the older people."* The small manufacturing enterprise believes that even though they may have the knowledge, training will be beneficial to enable the enterprise to make use of the ERP system.

Two enterprises agreed with the statement: 'ERP *systems may not be compatible with other systems we use*'. Four enterprises disagreed with statement C_S10, implying that ERP systems are considered to be compatible with other systems currently in use by the small manufacturing enterprises in the sample.

6.4 SUMMARY

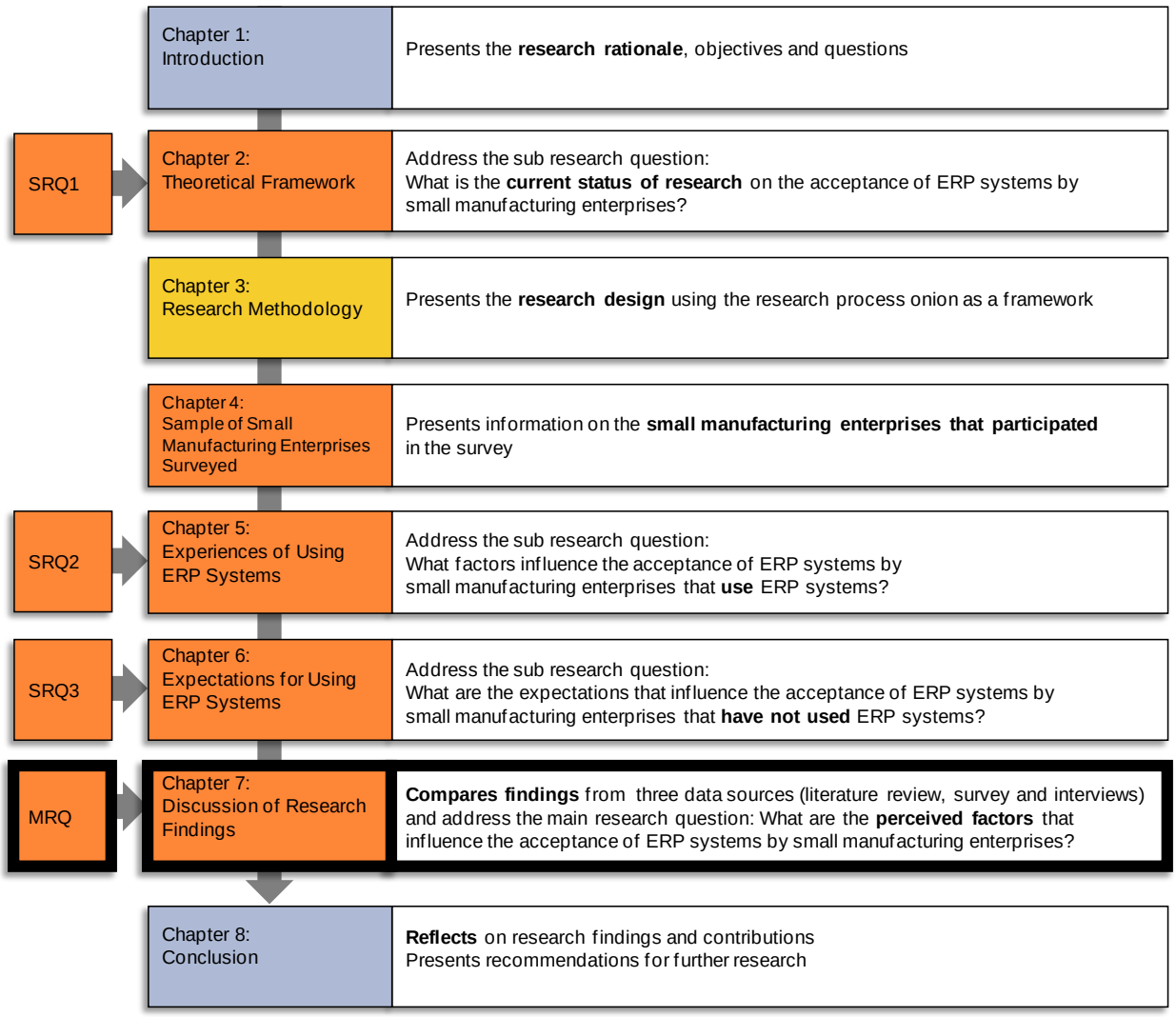
This chapter presented data collected from 9 small manufacturing enterprises that do not use ERP systems. The preliminary analysis indicates that, as with small manufacturing enterprises that use ERP systems, small manufacturing enterprises that do not use ERP systems would accept and use an ERP system if it supported the advancement of business operations. There is also an indication that small manufacturing enterprises that do not use ERP systems expect ERP systems to provide a cost-effective solution to manage business functions, with access on-demand, including mobile access. The purchase of an ERP system is, to a large extent, influenced by branding. These small manufacturing enterprises believe they are ready to purchase and use ERP systems, provided the ERP system supports their enterprise.

Next, Chapter 7: Discussion of Research Findings compares findings from small manufacturing enterprises that have used or currently use ERP systems (Chapter 5) with findings from small manufacturing enterprises that do not use ERP systems.

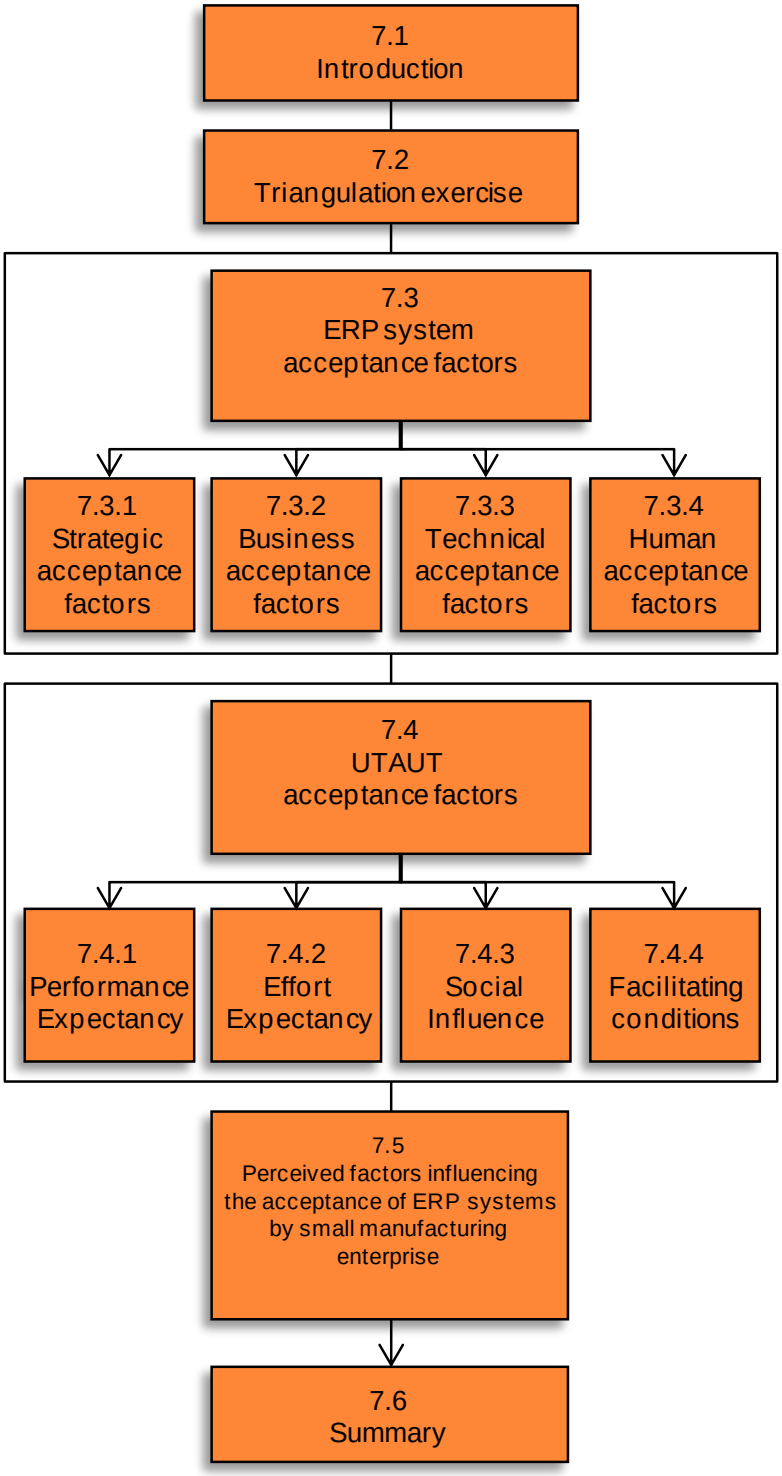
CHAPTER 7:

DISCUSSION OF RESEARCH FINDINGS

Stage in Dissertation



Map of Chapter 7



7.1 INTRODUCTION

This chapter presents a synthesis of findings from small manufacturing enterprises that have experience of using ERP systems (Chapter 5) and small manufacturing enterprise that do not have experience (Chapter 6) using ERP systems.

This chapter addresses the main research question:

MRQ: What are the perceived factors that influence the acceptance of ERP systems by small manufacturing enterprises?

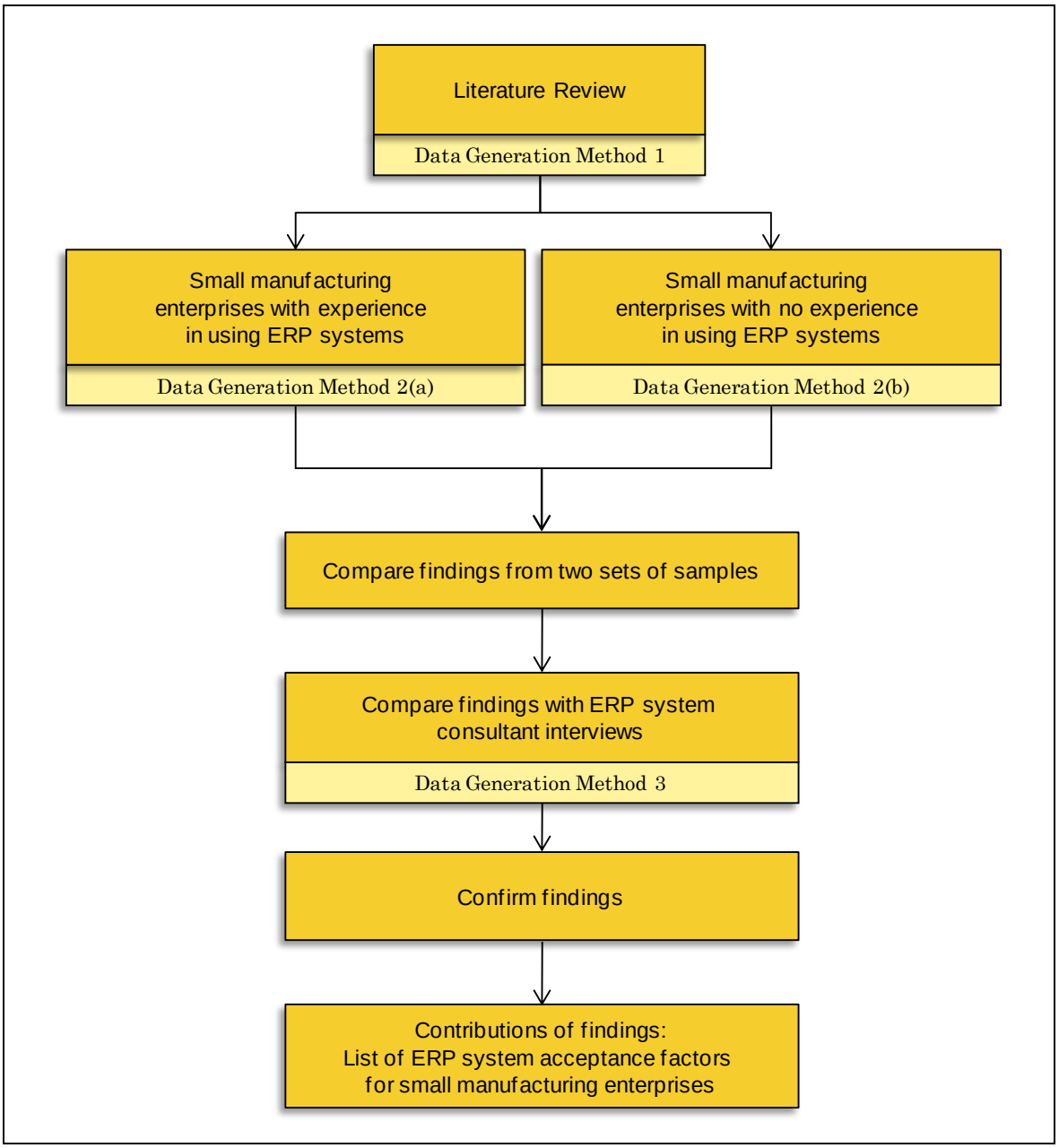
Section 7.2 presents a discussion on the triangulation of data from the literature review, the survey and the interviews with ERP system consultants. Section 7.3 presents findings on ERP system specific acceptance factors; these are grouped under strategic, business, technical and human acceptance factors. Section 7.3 presents findings from the evaluation of UTAUT acceptance factors; these are grouped under: performance expectancy, effort expectancy, social influence and facilitating conditions. The chapter then progresses to address the MRQ in Section 7.4. A summary (Section 7.5) of the discussion of findings concludes this chapter.

7.2 TRIANGLUATION EXERCISE

In Section 3.7: Data triangulation, it was discussed, that in order to ensure reliability of data findings, the exercise of data triangulation is recommended to assist the researcher to ensure that the data collected from one data collection method are confirmed with two or more other data collection methods. In this study, findings were collected from literature (Chapter 2), a survey done with small manufacturing enterprises that use ERP systems (Chapter 5) as well as those that do not (Chapter 6), and interviews with ERP system consultants (Appendix F: Interview Responses).

Findings from the survey done with small enterprises that have experience in using ERP systems are compared with findings from the small manufacturing enterprises that do not have experience in using ERP systems and this is illustrated in Figure 33.

Figure 33: Comparison and confirmation of research findings



This is then collectively compared with findings from the interviews conducted with the ERP system consultants as part of the data triangulation exercise done with the literature review findings.

If there is agreement in the findings, the findings can be regarded as being consistent and reliability is confirmed. This would then lead to the final contribution of this study, that is, a consolidated view of ERP system acceptance factors considered by small manufacturing

enterprises. However, if findings from one data collection method contradict findings from other data collection methods, further research is recommended to investigate the difference in findings.

The interview data and findings are presented in the context of the survey findings presented in this chapter. For the detailed data from all interviews, refer to Appendix F: Interview Responses.

7.3 ERP SYSTEM ACCEPTANCE FACTORS

This section discusses the findings regarding strategic, business, technical and human acceptance factors gathered from small manufacturing enterprises and commented on by the ERP system consultants interviewed.

7.3.1 Strategic acceptance factors

An analysis of the data presented in Sections 5.4.1, and 6.3.1 (perceived factors of acceptance of ERP systems) shows that all small manufacturing enterprises, irrespective of experience in using ERP systems or not, consider ERP systems important to the strategic development of the small manufacturing enterprise. A discussion on the findings with regard to strategic acceptance factors follows. Table 30 lists the ranking of *strategic acceptance factors* from the two groups of small manufacturing enterprises surveyed.

Table 30: Ranking of strategic acceptance factors

	Strategic acceptance factors	**Experiences of using ERP systems**	**Expectations for using ERP systems**
1.	Better business planning and consolidation	2	1
2.	Enables business growth and strategic alignment	1	3
3.	Manage complexity and cost efficiently adapt to changes	4	6
4.	Improve stakeholder relationship and trust	5	9
- Continued on next page -			

Table 30: Ranking of strategic acceptance factors (Continued)

5.	Industry necessitates the use of an ERP system	12	10
6.	Competition in industry	11	11
7.	Long term investment sustainability	Could not be determined	1
8.	Intelligent aware – helps alerts to changes in market forces	Could not be determined	Could not be determined

- The most important strategic acceptance factor noted by small manufacturing enterprises that use ERP systems is: '*enables business growth and strategic alignment*', and is consistent with research by Poba-Nzaou [2008] that states that an ERP system should support strategic decision-making within small manufacturing enterprises.

- The second factor ranked by small manufacturing enterprises that either use or do not use ERP systems is: '*better business planning and consolidation*' (Figure 25 and Figure 35). These findings support findings from Iskanius [2009] that identified the need for small manufacturing enterprises to improve the business planning process.

- *'Managing complexity and cost efficiently adapt to changes'* was the strategic acceptance factor ranked 4th and 6th most important strategic acceptance factor, as indicated by the two groups of users and non-users of ERP systems, respectively. Tagliavini, et al. [2002] suggested that ERP systems are more suited to large enterprises to support complexity. However, the findings from the small manufacturing enterprises indicate small manufacturing enterprises would like to manage complexity and change from the time of establishment. Many of the small manufacturing enterprises that participated are young enterprises that want to expand growth. Therefore the use of an ERP system to manage complexity and change is an important factor in the acceptance of ERP systems.

- The 5th and 9th most important strategic acceptance factor, as indicated by small manufacturing enterprises that use and that do not use ERP systems, respectively, is '*improving stakeholder relationship and trust'*. The findings support studies exploring the use of small manufacturing enterprise ERP systems in the value and supply chain. It also supports research by Iskanius [2009] that highlights the need for small manufacturing enterprises to improve customer-specific flexibility and supplier interaction.

- The 12th and 10th most important strategic acceptance factors selected by the small manufacturing enterprises focus on the industry's call for ERP system use.

- Both types of enterprises selected '*competition in industry'* as their 11th most important strategic acceptance criteria. The small manufacturing enterprises are not as motivated to use ERP systems on this basis, compared to other strategic acceptance factors as ranked.

- Lastly, although not clearly ranked against other strategic acceptance factors, '*long term investment sustainability*' is another important acceptance factor, ranked only by small manufacturing enterprises that have not used ERP systems. The investment benefit of ERP systems ranked as one of the most important acceptance factor in terms of ERP system acceptance factors (Section 6.3.1.4: Top three most important ERP system acceptance factors).

- An ERP system's capability to be '*intellectually aware'* and offer alerts to market forces did not draw similar findings across all small manufacturing enterprises. At this stage the rank of this acceptance factor could not be determined.

Even though the small manufacturing enterprises consider themselves ready to make use of ERP systems to support strategic plans, opinions from the ERP system consultants differ and emphasize that the younger and more mature small manufacturing enterprise needs to consider its ERP system purchase decision carefully.

A comment by one ERP system consultant suggests that, depending on enterprise readiness, a decision to use ERP systems can be made "…*let us help you to decide if you are ready for a new switch. We will go through a process to assess readiness. Why spend when you are not yet ready to explore the full potential of an ERP system*." A comment by another ERP system consultant highlighted enterprise maturity as a variable in ERP system use: "*If you ask any of our clients "Why did you buy this system?" they will tell you: "To become a better business, to grow, to sustain, to manage, to maintain quality, etc. That is why I agree with the rankings and once again, this may change, depending on the maturity of the small enterprise"*."

7.3.2 Business acceptance factors

An analysis of the data presented in Sections 5.4.1 and 6.3.1 (perceived factors of acceptance of ERP systems) reveals that small manufacturing enterprises would use ERP systems to support

business operations. The use of ERP systems to support business operations is central to the decision to purchase and make use of ERP systems.

From the perspective of small manufacturing enterprises, operational aspects that ERP systems should support include typical business functions supported by standard ERP systems: client relationship management, supplier relationship management, manufacturing execution management, financial management, human resource management, and business intelligence/analytical reporting.

'Other' important features that participants noted included: stock management, product catalogue management, price history system, links to other systems such as Microsoft Word documents and Microsoft Excel spreadsheets, link to emails, and showing workflow of all activities in progress. Some small manufacturing enterprises also want to store attachments of design to records of information: "*I also want to combine design tools with the systems. I want to link images of my furniture design to my customer record to know what furniture designs my customer likes*."

A discussion on the findings with regards to business acceptance factors follows. Table 31 lists the ranking of *business acceptance factors* from the two groups of small manufacturing enterprises surveyed.

Table 31: Ranking of business acceptance factors

	Business acceptance factors	**Experiences of using ERP systems**	**Expectations for using ERP systems**
1.	Advance business operations	3	1
2.	Promote transparent governance and improve operational efficiency	6 (9, 11)	4
3.	Timely analytical-supported decision-making ability	7	5 (8, 9)
4.	Manage cash, liquidity, and financial risk better	8	7
5.	Low total cost of ownership – maintenance, upgrades, consultation, training, etc	Could not be determined	2
- Continued on next page -			

Table 31: Ranking of business acceptance factors (Continued)

6.	Cost saving through optimization of IT (information technology)	9	5
7.	Manage the workforce through rapid change	10 (12)	12
8.	Follow industry best practices	Could not be determined	Could not be determined

- The most important business acceptance factor ranked by small manufacturing enterprises that do not use ERP systems is '*advance business operations'* (Figure 25 and Figure 35). This supports findings from Marnewick & Labuschagne [2005], who identified the small manufacturing enterprise's need for ERP systems to support business decision making and operations management.

- '*Promoting transparent governance and improving operational efficiency*' is jointly the 6th, 9th and 11th most important acceptance factor by small manufacturing enterprises that use ERP systems and the 4th most important acceptance factor as indicated by those that do not use ERP systems, respectively. It is also the second most important business factor ranked. ERP system must not merely support the advancement of business operations, but also leverage daily enterprise operations. Some caution is given from Lim, et al. [2005, p. 146] who states that the use of ERP applications 'will not lead to improved operational performance due to disempowerment anxieties, system complexity, and the steep learning curve it imposes on users.' In the context of small manufacturing enterprises, further research is recommended to support or refute such findings.

- Overall, the 7th and 5th business acceptance factor is '*timely analytical-supported decision-making ability*', as ranked by both users and non-users of ERP systems. Decision-making is vital to any business and ERP systems should facilitate the process by providing required business information. This finding supports the work of Loh and Koh [2004], who state that ERP systems should provide better information to support better business decision making within the enterprise.

- The 8th and 7th most important business acceptance factor ranked by both users and non-users of ERP systems is '*managing cash, liquidity and financial risk better*'. The cost efficiency qualities of ERP systems are therefore considered important to the small manufacturing

enterprises. This supports research by Klaus [2000], who discusses the necessity of financial and cash management components of ERP systems.

- '*Cost saving through optimisation of IT*', was ranked 9th and 5th by users and non-users. This highlights the financial and cost-saving features that ERP systems should deliver. The small manufacturing enterprise should obtain information from the ERP system to support cost savings within the enterprise.

- With regard to the cost of ERP systems, users and non-users expect to minimise overall costs and realise maximum benefits that can be afforded by the implementation and use of the ERP system. This in line with views expressed by Quiescenti, et al. [2006] and Ziaee et al. [2006] on the cost of ERP system acquisition and implementation. The responses from the small manufacturing enterprises reiterate that total cost of ownership is an important acceptance factor to consider. '*Low total cost of ownership*' was ranked as the second most important acceptance factor, across other strategic, business, technical or human acceptance factors. ERP systems need to be 'affordable', as commented by one small manufacturing enterprise. Other comments included: "what fails to grab my attention is the cost"; "cost is always an issue"; "too expensive for a young enterprise like me"; "must make it lower for us small enterprises."

  An ERP system consultant responded to the issue of cost as follows: "... everyone wants the best for less and setting up and maintenance is a costly business. So for the expense made, one should note that they are getting the best out there … *why spend when you are not yet ready to explore the full potential of an ERP system*." A second ERP consultant emphasizes that "small enterprises must be smart and spend *wisely* … cost is [by] far one of the most important factors … *Cost is relative*. Small manufacturing enterprises pay for good service and not just the product. We therefore emphasise *the total solution package, including from cost, usability, functionality, training, service and meeting user requirements.*"

  ERP system vendors and small manufacturing enterprises should work together to discuss issues pertaining to ERP system costs. Since the manufacturing industry needs may be different from that of other industries, appropriate costs for licences, maintenance, upgrades and training should be considered.

- The acceptance factor: '*manage the workforce through rapid change'* ranked 10th and 12th, by both users and non-users of ERP systems, respectively. ERP systems are not regarded as an important enabler for workforce management during rapid change.

- The acceptance factor: '*follow industry best practices*' could not be ranked by both small manufacturing enterprises that use ERP systems and those that do not. An ERP system consultant commented "… we find *our small enterprises prefer to follow what is generally accepted best business practises* ... we *want you to follow recommended processes that will help grow and sustain your enterprise in the long run*." Judging from this comment, this is another controversial feature of ERP systems. It seems that small enterprises participating in this survey do not place value on following best practice.

7.3.3 Technical acceptance factors

An analysis of the data presented in Sections 5.4.1 and 6.3.1 (perceived factors of acceptance of ERP systems) indicates that small manufacturing enterprises do consider technical factors related to ERP system acceptance as important. Table 32 lists the ranking of *technical acceptance factors* from the two groups of small manufacturing enterprises surveyed.

Table 32: Ranking of technical acceptance factors

	Technical acceptance factors	**Experiences of using ERP systems**	**Expectations for using ERP systems**
1.	Provision of functionality on demand – ability to "switch on and switch off" functionality	1	1
2.	Accessibility: anytime, anywhere, including mobile and web accessibility	Could not be determined	1
3.	Integration with other business systems	2	Could not be determined
4.	Quick implementation time	Could not be determined	Could not be determined

Most importantly, small manufacturing enterprises say they will accept ERP systems, provided the system allows access to functionality on-demand, that is the '*provision of functionality on-demand with the ability to "switch on and switch off" functionality*', including additional

capability for "mobile accessibility to enterprise functions and financial statements", as commented by certain small manufacturing enterprises that do not use ERP system.

ERP system consultants had the following to say about accessibility of functionality: "... *on-demand reporting, dashboard styles and indicators, real time analysis is something to look out for. We are excited at the opportunity for mobile, anywhere, anytime access to the business*."

These findings from the small manufacturing enterprises and ERP system consultants correspond with research that focuses on the provision and configuration of functionality [Dreiling, et al., 2005]. Furthermore, the findings also support research conducted by [Equey & Fragnière, 2008; Hofmann, 2008; Yang, et al., 2007] on access to use ERP systems.

Small manufacturing enterprises that use ERP systems also consider '*integration with other business systems'* as being important and this was ranked as the second most important ERP system acceptance factor. Although the finding on ERP system integration with other systems corresponds with the research done by [Bernroider & Leseure, 2005; Elbertsen, et al., 2006], further research is recommended to identify particular and necessary system integration. The small manufacturing enterprises in this study did not worry about '*quick implementation time'*. Further research is necessary to establish the reason for this non-response.

7.3.4 Human acceptance factors

An analysis of the data presented in Sections 5.4.1 and 6.3.1 (perceived factors of acceptance of ERP systems) indicates that small manufacturing enterprises want to be able to use the ERP system without hassle. The experience of using the ERP system should be satisfying. Table 33 lists the ranking of *human acceptance factors* from the two groups of small manufacturing enterprises surveyed.

Table 33: Ranking of human acceptance factors

	Technical acceptance factors	Experiences of using ERP systems	Expectations for using ERP systems
1.	User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done	Could not be determined	3
2.	"Start and go" self-learning – minimal training costs	Could not be determined	Could not be determined

The third most important acceptance factor ranked by non-users relates to the experience of using the ERP system: '*User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectations to get the work done*'. Additional comments given by some small manufacturing enterprises emphasize the need for ERP systems to be: "*user friendly, easy to use, simple, quick*", "*not many screens to go through*", "*no fancy buttons and tools hardly used*", "*it must fit my enterprise and be easy enough to train the relevant workers to use*."

An ERP system consultant responded: "We run through several demonstrations and training sessions to familiarise the users with the system look, feel and navigation and tell them that everything takes time to adjust, *just like learning the gears of a car*. We are aware that the detailed inputs can be seen as 'too much and confusing', but once again we emphasize the benefits of a complete system." A second ERP system consultant emphasized that, "*The experience of using the system is just as important*. We do not want users to feel using the system is a tedious administration bore. We invest a lot of research and development in testing the overall functionality and user experience of our product."

These findings on user experience correspond with research that explored the usability of the ERP system in order to promote acceptance of ERP systems [Calisir & Calisir, 2004; Markus & Tanis, 2000; Marnewick & Labuschagne, 2005; Scott & Walczak, 2009].

The statement on '*"start and go" self-learning – minimal training costs'* did not solicit any direct responses from small manufacturing enterprises in this study. However, training is a consideration, as stated in Section 2.5: Technology acceptance of ERP systems. One comment

suggests that training is an ERP system acceptance factor that must be considered: "*be easy enough to train the relevant workers to use*". A comment by one of the ERP system vendor consultants suggests the importance of training and frequent use to promote acceptance of ERP systems: "*Using systems such as ERP is a mind shift*. There are lots of changes involved. Switch over to the new system can cause a lot of anxiety and confusion, but what people need to realise is that they *need to give the system a chance*. I believe *if the users actively attend training, use the system on a daily or near daily basis, it will become intuitive and 'as easy as pie' to work with*."

The way users interact with ERP systems needs to be carefully assessed to promote acceptance and continued use of ERP systems by users and non-users alike.

7.4 UTAUT ACCEPTANCE FACTORS

Section 2.2.2 introduced the UTAUT model by Venkatesh, et al. [2003] (Figure 6).

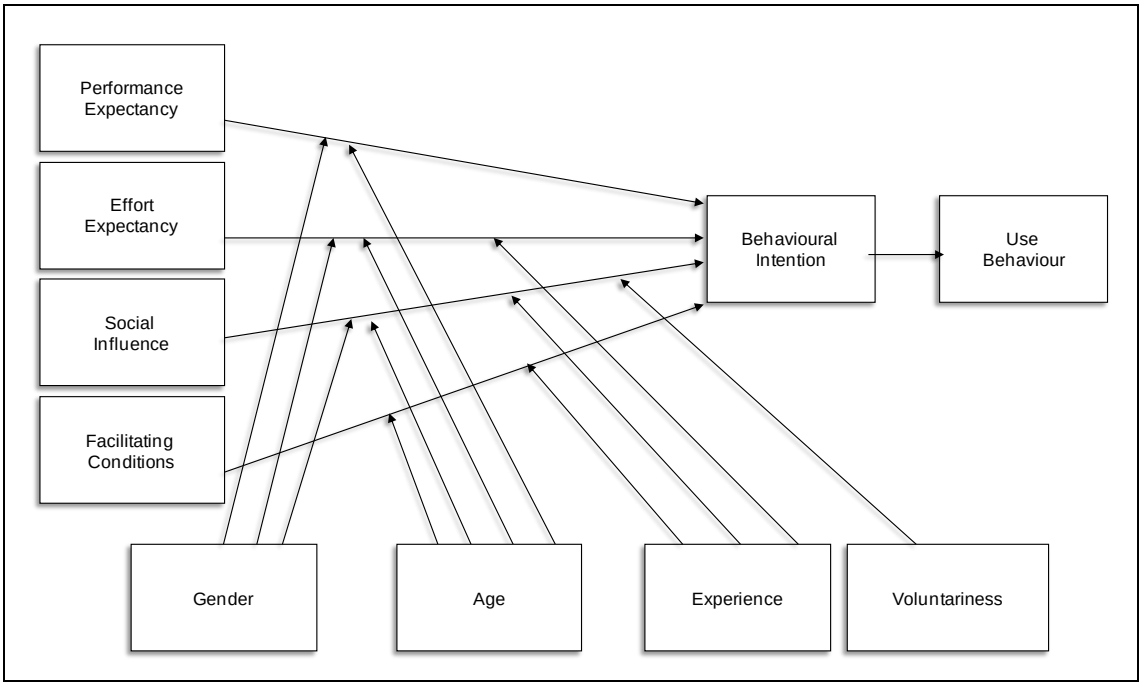


Figure 6 : UTAUT Model [Venkatesh, et al., 2003]

According to the UTAUT model, 4 direct determinants of usage intention and behaviour (performance expectancy, effort expectancy, social influence and facilitating conditions) are

moderated by gender, age, experience and voluntariness. A discussion of findings supporting the four determinants of usage intention and behaviour follows.

7.4.1 Performance expectancy

According to the findings of Venkatesh, et al. [2003], performance expectancy is a determinant of the intention to use a system and the perceived belief that using a system will support job performance. Furthermore, performance expectancy is 'more significant for men and younger workers' [2003, p. 467].

ERP systems should assist in accomplishing tasks more quickly and should contribute positively to the profitability of the small manufacturing enterprise.

Small manufacturing enterprises that have experience (4 female-owned) in using ERP systems and small manufacturing enterprises that do not have experience (6 male-owned) in using ERP systems agree on statements relating to performance expectancy.

Although an indication exists that male-owned small manufacturing enterprises and younger small manufacturing enterprises believe strongly in performance expectancy, there is no substantial evidence to support the findings of Venkatesh, et al. [2003] on the significance of performance expectancy in terms of men and younger small manufacturing enterprises.

7.4.2 Effort expectancy

Venkatesh, et al. [2003] state that effort expectancy is a determinant of intention to use a system and the perceived belief that it should be easy to use a system. Furthermore, effort expectancy is 'more significant for women and older workers, and those effects decrease with experience' [2003, p. 467].

The data analyzed indicate that using ERP systems should be easy. All small manufacturing enterprises, irrespective of whether or not they have used an ERP system, strongly agree that the interface of ERP systems should be clear and understandable. Small manufacturing enterprises that have experience in using ERP systems agree that learning to use the ERP system should be easy. Small manufacturing enterprises that do not have experience in using ERP systems, on the other hand, strongly agree that it should be easy to become skilled at using an ERP system and

also strongly agree that using the ERP system should be easy. Small manufacturing enterprises that use ERP systems and small manufacturing enterprises that have no experience in using an ERP system strongly agreed on statements relating to effort expectancy. It is thus apparent from the findings that the concept of effortlessness of use is a contributor to acceptance of ERP systems.

No indication exists that female-owned small manufacturing enterprises have to make more effort than male-owned enterprises to use ERP systems. There is no substantial proof to support Venkatesh, et al.'s findings [2003] on the significance of effort expectancy in terms of women and older small manufacturing enterprises.

7.4.3 Social influence

According to findings from Venkatesh, et al. [2003], social influence is a determinant of intention to use a system and the perceived belief that important others believe that a system should be used. Furthermore, 'the effect of social influence on intention is contingent on all four moderators ... such that ... it [is] non significant when the data were analyzed without the inclusion of moderators' [Venkatesh, et al., 2003, p. 467]

In general, small manufacturing enterprises that have experience in using ERP systems and small manufacturing enterprises that do not have experience in using ERP systems, irrespective of gender of users, agree to some extent that people can influence the use of ERP systems.

Additionally, social influence on small manufacturing enterprises with no ERP system experience cannot be conclusively deduced. An equal number of small manufacturing enterprises agree and disagree with the statement that people who influence the small manufacturing enterprises behaviour's think that it should use an ERP system. However, 1 of the 7 enterprises strongly agrees with the statement; and 2 of the 7 neither agrees nor disagrees. Most small manufacturing enterprises agree that people who are important to the small manufacturing enterprise think that it should use an ERP system.

7.4.4 Facilitating conditions

Venkatesh, et al. [2003] state that facilitating conditions are determinants of intention to use a system and a perceived belief that the organisational and technical infrastructure to support the

use of a system exists. Furthermore, facilitating conditions are 'only significant when examined in conjunction with the moderating effects of age and experience' [Venkatesh, et al., 2003, p. 467].

Small manufacturing enterprises that have experience in using ERP systems and small manufacturing enterprises that do not, irrespective of years of establishment or experience, agree that they have the resources ready to make use of ERP systems.

Small manufacturing enterprises that have experience in using ERP systems, irrespective of enterprise maturity; all agree that they have the resources and knowledge to make use of ERP systems. These small manufacturing enterprises also believe that the ERP system in use is compatible with other systems in use. They also believe that assistance is available when they require it.

Although small manufacturing enterprises that have an expectation to the use of an ERP system agreed on statements that were used to assess facilitating conditions; some of the responses were 'neither disagree nor agree'. This could be attributed to the fact that the small manufacturing enterprises may not know what to expect and still need to acquire knowledge on a particular ERP system before commenting on the statements relating to facilitating conditions.

A response from 1 of the 9 small manufacturing enterprises that does not have experience in using ERP system, which agreed with the statements relating to assessing facilitating conditions, remarked, "*When we get a new system in place, I would like everyone working in the office to get training - even the older people*." Training is considered important to enable the small manufacturing enterprise to make use of ERP systems. The diversity of small manufacturing enterprise maturity and experience could not conclusively be regarded as moderating effects of age and experience on the facilitating conditions of ERP system use.

Although the impact of the moderation effects of enterprise age and experience cannot be conclusively determined, 3 of the 9 small manufacturing enterprises that do not have experience in using ERP systems have been in existence for between 1 and 5 years. This may be an indication that younger enterprises want to implement ERP systems from the time of establishment.

7.5 PERCEIVED FACTORS INFLUENCING THE ACCEPTANCE OF ERP SYSTEMS BY SMALL MANUFACTURING ENTERPRISES

The main research question, MRQ, can be addressed from numerous and unifying viewpoints.

MRQ: What are the perceived factors that influence the acceptance of ERP systems by small manufacturing enterprises?

From one perspective, the findings from the assessment of the 4 direct determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions) of UTAUT model support the UTAUT model to some extent. All small manufacturing enterprises questioned, irrespective of their having or not having experience in the use of ERP systems, believe that although the enterprise can be influenced by others to accept and make use of ERP systems, it is not a seen as a key influence on acceptance. The small manufacturing enterprises, in general, also believe they are knowledge-and-resource ready to accept ERP systems.

From the perspective of strategic, business, technical and human acceptance factors, these are all perceived as important. Table 34 lists a consolidated list of ERP system acceptance factors.

Table 34: Small manufacturing enterprises and ERP system acceptance factors

Category		**Factors**
UTAUT Acceptance Factors	1	Performance Expectancy
	2	Effort Expectancy
	3	Social Influence
	4	Facilitating Conditions
Strategic	1	Better business planning and consolidation
	2	Enables business growth and strategic alignment
	3	Manage complexity and cost efficiently adapt to changes
	4	Improve stakeholder relationship and trust
	5	Industry necessitates the use of an ERP system
	6	Competition in industry
	7	Long term investment sustainability
	8	Intelligent aware – helps alerts to changes in market forces

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Table 34: Small manufacturing enterprises and ERP system acceptance factors (Continued)

Business	1	Advance business operations
	2	Promote transparent governance and improve operational efficiency
	3	Timely analytical-supported decision-making ability
	4	Manage cash, liquidity, and financial risk better
	5	Low total cost of ownership – maintenance, upgrades, consultation, training, etc
	6	Cost saving through optimization of IT (information technology)
	7	Manage the workforce through rapid change
	8	Follow industry best practices
Technical	1	Provision of functionality on demand – ability to "switch on and switch off" functionality
	2	Accessibility: anytime, anywhere, including mobile and web accessibility
	3	Integration with other business systems
	4	Quick implementation time
Human	1	User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done
	2	"Start and go" self-learning – minimal training costs

Strategic and business factors focus on the ERP system, which supports long-term planning, sustainability and daily interactions and operations of the enterprise. A notable technical factor is to have the ability to access functionality and information from any location, including mobile and web access. The experience of using the ERP system should be just as satisfying and support the efficient and effective functioning of the enterprise.

The findings also suggest that the small manufacturing enterprises are optimistic and enthusiastic about the capabilities of ERP systems: ERP systems are seen as a means to leverage enterprise operations.

The role of ERP system brand reputation can influence a small manufacturing enterprise's decision to purchase and use an ERP system. Some small manufacturing enterprises focus on system functionality and comments such as the following should be noted: "*We are caught up in so much branding. We sometimes forget that other brands have quality too. I want an ERP*

system that works for me and my enterprise." Most small manufacturing enterprises, nonetheless, look for a brand presence and concur with the following comment expressed by a small manufacturing enterprise: "A good brand is recognised; it means people are using it. It must be working right. So if so many other customers are happy with it, let me also try it; and then if it doesn't work I will speak out and say so."

ERP system consultants, share similar enthusiasm with the small enterprises, but still express caution and advise that small enterprise maturity and change management processes should be carefully considered when making a decision to acquire, implement, use and accept ERP systems. The comments made by ERP system consultants are provided in Table 35.

Table 35: ERP system consultants' comments

1. "… small manufacturing enterprises in South Africa **have not reached the maturity** of medium and large manufacturing enterprises to purchase and use specialised software such as ERP. The smaller companies can suffice using standard off-the-shelf accounting and payroll packages."

2. "If a simpler, cheaper system can perform what is required, then consider the option and **re-evaluate your need for a more advanced system such as ERP at a later, more mature stage of your enterprise growth**."

3. "... let us help you to decide if you are ready for a new switch. We will go through *a* **process to assess readiness.** Why spend when you are not yet ready to explore the full potential of an ERP system."

4. "**Using systems such as ERP is a mind shift.** There are lots of changes involved ..."

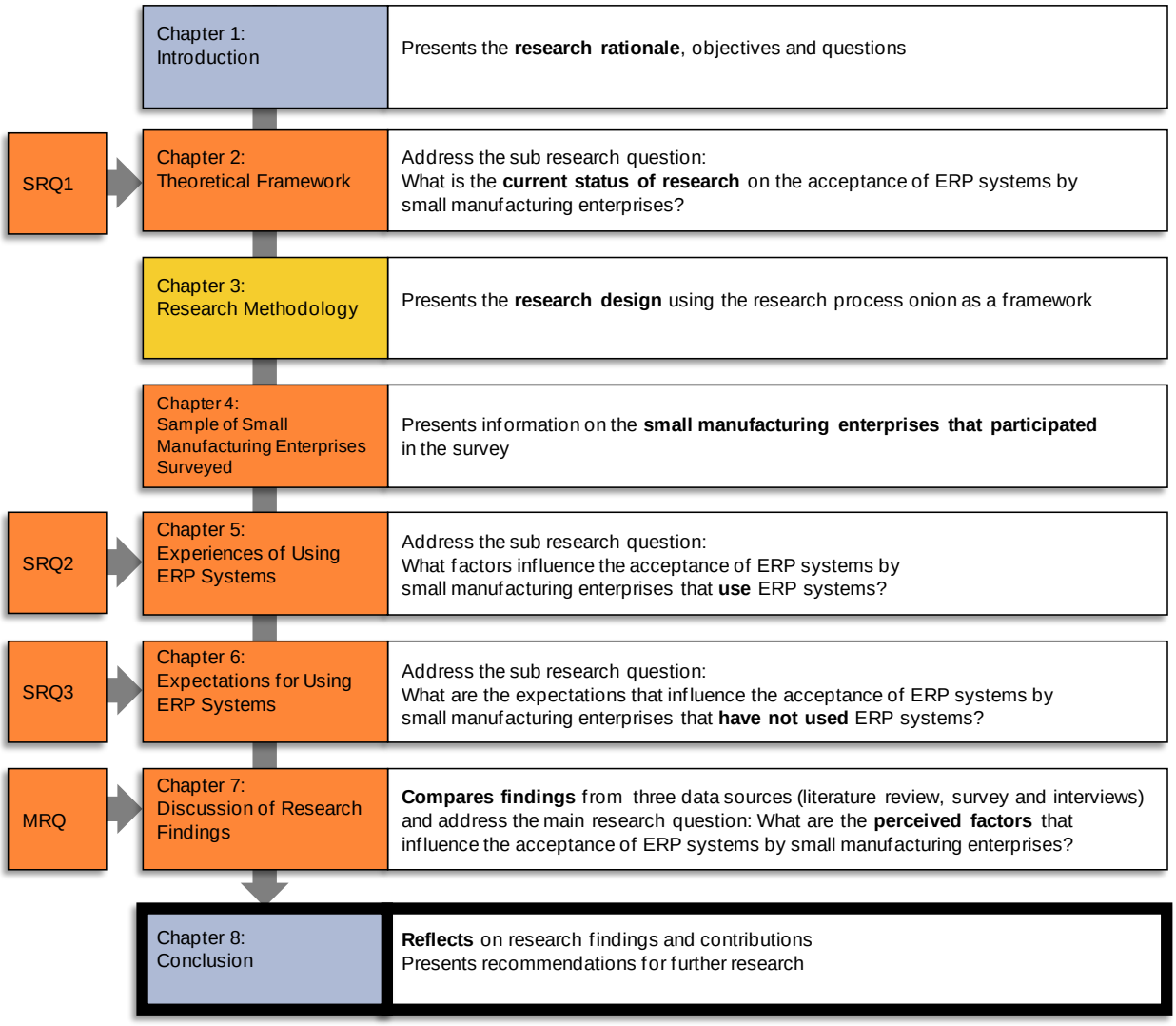
5. "... one must be careful of unscrupulous vendors gift-wrapping systems that don't suit the small enterprise. Small enterprises must be smart and spend wisely. They **must know what they are buying themselves into**."

7.6 SUMMARY

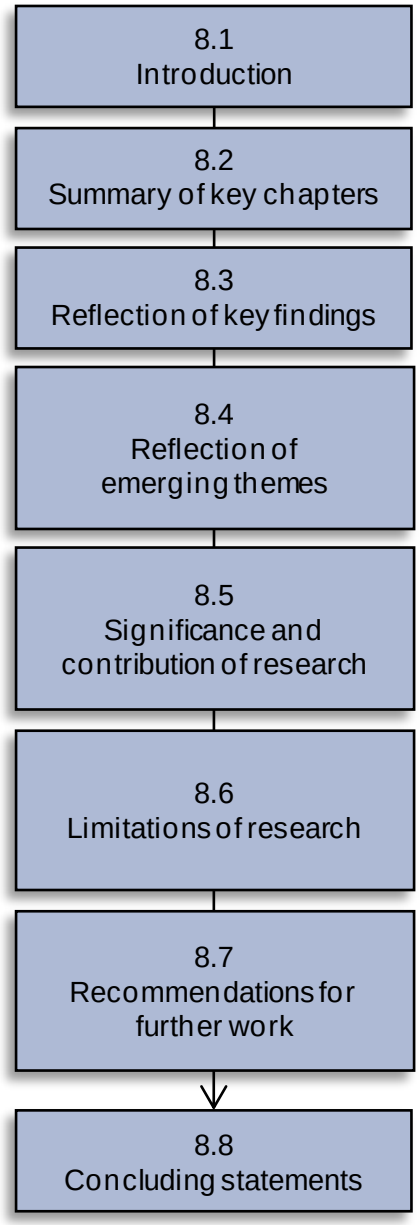
This chapter discussed key research findings. Key findings that emerged include strategic and business acceptance factors that ERP systems should satisfy. Technical and human factors are, however, also important influencers and must be considered in order to promote ERP system acceptance. Small manufacturing enterprises, irrespective of whether or not they are using an ERP system, appear willing to use ERP systems that meet their requirements. However, the view of ERP system consultants is that acquiring ERP systems is an important decision that should be left for more mature small manufacturing enterprises to make. Chapter 8: Conclusion, concludes this dissertation by reflecting on the outcomes from this study.

CHAPTER 8: CONCLUSION

Stage in Dissertation



Map of Chapter 8



8.1 INTRODUCTION

The intention of this study was to explore acceptance of ERP systems by small manufacturing enterprises, the objective being to consolidate a list of acceptance factors relating to ERP systems. A summary of each chapter is provided (Section 8.2). Key research findings (Section 8.3) and conclusions drawn (Section 8.4) are detailed. The research findings are beneficial to both academic and industry audiences and this contribution of the study is highlighted (Section 8.5). The limitations encountered (Section 8.6) are mentioned as well as a number of recommendations (Section 8.7) for future inquiry. The closing remarks (Section 8.8) succinctly summarise the outcomes of this study.

8.2 SUMMARY OF KEY CHAPTERS

Section 1.10: Dissertation Structure presented the structure for this dissertation and presented the focus of each of the 8 chapters. In this section, a brief summary highlighting focal points of each chapter (1 to 7) is given.

- Chapter 1: Introduction, defined this study. The research rationale and the context of the study were set by the thesis statement posed in Section 1.3: *The acceptance of ERP systems by small manufacturing enterprises in South Africa is influenced by strategic, business, technical and human factors.*
- The theoretical framework presented in Chapter 2: Theoretical Framework formed the backbone of this study, with a discussion on current research into technology acceptance and ERP systems, and an introduction to small manufacturing enterprises. Each concept was briefly discussed in general and then a more focused view was used to explore technology acceptance of ERP systems by small manufacturing enterprises. An important finding was the lack of literature exploring the acceptance of ERP systems by small enterprises, making this study a unique exploratory study.
- Chapter 3: Research Methodology, presented the research design for this study. The research methodology was depicted in the form of an adapted research process onion (Figure 15). The research design specifically catered to the needs of this study so as to ensure the required data would be collected and validated for reliability.

- Background data collected from the sample of small manufacturing enterprises surveyed was presented in Chapter 4: Sample of Small Manufacturing Enterprises Surveyed. The separation of data collected made it easier to analyse and compare findings from the two groups of small manufacturing enterprises surveyed.
- Chapter 5: Experiences of Using ERP Systems, presented data collected from small manufacturing enterprises that have previously used or are currently using ERP systems. The data indicated the importance of ERP systems acceptance factors that not only influenced the intention to use ERP systems, but also the actual use of ERP systems.
- Chapter 6: Expectations for Using ERP Systems, presented data collected from small manufacturing enterprises that do not use ERP systems. The data indicated the perceived importance of strategic, business, technical and human ERP systems acceptance factors that could influence the intention to use ERP systems.
- Chapter 7: Discussion of Research Findings provided a synthesis of all findings. These findings are reflected in Section 8.3.

8.3 REFLECTION OF KEY FINDINGS

The findings derived from literature, from the survey on small manufacturing enterprises, and from the interviews with ERP system consultants, allowed for the research questions to be addressed.

SRQ1: What is the current status of research on the acceptance of ERP systems by small manufacturing enterprises?

SRQ1 was addressed in Chapter 2. Literature focusing on ERP system acceptance by small manufacturing enterprises was explored. Very little literature on ERP system acceptance by small manufacturing enterprises was found. In addition to a lack of current research, it was found that studies focused mainly on small and medium enterprises and rarely focused exclusively on small enterprises. The lack of industry specific research also meant that there is still potential for further investigation in industries such as the manufacturing industry. Finally, acceptance testing of technology was confined to laboratory testing and rarely in the real world environment of research participants.

SRQ2: What factors influence the acceptance of ERP systems by small manufacturing enterprises that use ERP systems?

SRQ2 focused on soliciting the factors that influence the acceptance of ERP systems by small manufacturing enterprises that use ERP systems (Chapter 5). There are a number of factors. Firstly, small manufacturing enterprises that use ERP systems require on-demand functionally and ERP systems that support strategy and business development. Secondly, small manufacturing enterprises that use ERP systems view the integration of an ERP system with other systems as important. Thirdly, small manufacturing enterprises that use ERP systems, in general, support the use of ERP systems. There is also a belief amongst these enterprises (younger and more mature enterprises alike) that they are knowledge-and-resource ready. The features required by small manufacturing enterprises that use ERP systems emphasize a need for a holistic solution to enable and promote strategic and business success.

SRQ3: What are the expectations that influence the acceptance of ERP systems by small manufacturing enterprises that have not used ERP systems?

SRQ3 focused on soliciting the expectations that influence the acceptance of ERP systems by small manufacturing enterprises that have not used ERP systems (Chapter 6). There are a number of factors. Firstly, small manufacturing enterprises that have not yet used ERP systems also require on-demand functionally and ERP systems that support the advancement of business operations. Secondly, small manufacturing enterprises that have not used ERP systems expect the system to be easy to use, but also easy to learn to use. Thirdly, small manufacturing enterprises that have not made use of ERP systems, in general, support the use of ERP systems to advance strategic and business decision-making. These small manufacturing enterprises are also of the belief that they are knowledge-and-resource ready. Cost is a concern to small manufacturing enterprises that have not used ERP systems. The features required by small manufacturing enterprises that have not used ERP systems indicate a need for a holistic solution to support strategic, business, technical and user related requirements.

MRQ: What are the perceived factors that influence the acceptance of ERP systems by small manufacturing enterprises?

The main research question addressed in this study relates to the perceived factors that influence the acceptance of ERP systems by small manufacturing enterprises. The question addresses consolidate views from small manufacturing enterprises that use ERP systems with those of small manufacturing enterprises that have not used ERP systems but have expectations for future use of ERP systems. Chapter 7 discussed findings emanating from the study. The culmination of the findings from both types of small manufacturing enterprise indicates that all such enterprises take into consideration the acceptance factors posed. The extent of agreement may differ in terms of expectations and unique requirements. There may be changes over time, that is, from initial expectations to experience in using ERP system. Based on the findings derived from this study, small manufacturing enterprises, irrespective of experience or not, perceive the factors indicated in Table 34 as being essential.

Table 34: Small manufacturing enterprises and ERP system acceptance factors

Category		**Factors**
UTAUT Acceptance Factors	1	Performance Expectancy
	2	Effort Expectancy
	3	Social Influence
	4	Facilitating Conditions
Strategic	1	Better business planning and consolidation
	2	Enables business growth and strategic alignment
	3	Manage complexity and cost efficiently adapt to changes
	4	Improve stakeholder relationship and trust
	5	Industry necessitates the use of an ERP system
	6	Competition in industry
	7	Long term investment sustainability
	8	Intelligent aware – helps alerts to changes in market forces

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Table 34: Small manufacturing enterprises and ERP system acceptance factors (Continued)

Business	1	Advance business operations
	2	Promote transparent governance and improve operational efficiency
	3	Timely analytical-supported decision-making ability
	4	Manage cash, liquidity, and financial risk better
	5	Low total cost of ownership – maintenance, upgrades, consultation, training, etc
	6	Cost saving through optimization of IT (information technology)
	7	Manage the workforce through rapid change
	8	Follow industry best practices
Technical	1	Provision of functionality on demand – ability to "switch on and switch off" functionality
	2	Accessibility: anytime, anywhere, including mobile and web accessibility
	3	Integration with other business systems
	4	Quick implementation time
Human	1	User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done
	2	"Start and go" self-learning – minimal training costs

8.4 REFLECTION ON EMERGING THEMES

It has emerged from the research findings that ERP systems for small manufacturing enterprises should inevitably facilitate strategic, business, technical and human requirements. The quantifiable and subjective nature of the requirements should be carefully considered. Enabling the small manufacturing enterprise to gain the agility and organic growth they need, in order to respond to continual demands in the business arena is important. Acceptance factors that need to be considered must be considered. Failure to observe acceptance and adoption factors of ERP systems in small manufacturing enterprises may negatively influence the use of ERP systems, and experience of realising the benefits of using such systems.

It must be emphasized that a singular acceptance factor, or specific category of factors, is unlikely to radically influence ERP system acceptance; this view is supported in a study by

Verville, et al. [2005], which focuses on factors pertaining to ERP system acquisition. Due to the inclusive nature that characterises ERP systems, acceptance factors must be assessed in relation to other acceptance factors. The verification of the importance of certain ERP system acceptance factors over other ERP system acceptance factors was limited to descriptive analysis. An in-depth statistical analysis was beyond the scope of this dissertation. Further investigation, which provides more insightful findings on prioritisation of ERP acceptance factors, is recommended.

Furthermore, a number of themes and patterns of ERP system acceptance by small manufacturing enterprises have been identified in the study. The findings cannot be generalised to the larger population, but offer insight into ERP system acceptance by small manufacturing enterprises.

- From the data obtained from both types of small manufacturing enterprises, it would appear that specific sectors within the manufacturing industry are more ERP system aware than other sectors. The "Basic Metals, Fabricated Metal Products, Machinery & Equipment" and "Furniture" sectors have either implemented or plan to implement ERP systems as their enterprise grows. These two manufacturing sectors seem to understand the benefits of ERP system integration. These enterprises expect ERP system benefits to realise when purchasing and implementing ERP systems. If explored further, the research could provide more conclusive evidence on sector-specific implementation and use of ERP systems, as requested by Laforet and Tann [2006]. One of the ERP system consultants interviewed (Appendix F: Interview Responses) said that "… *niche manufacturing sector markets that focus on specialised and specific high-tech manufacturing processes, such as machinery and equipment sectors, should use ERP systems*." This indicates that the appropriateness of use of ERP systems needs to be carefully considered.
- A number of younger (1 to 5 years) and more established (11 to 15 years) enterprises use ERP systems. Enterprises established for more than 20 years, which were not aware of ERP systems before, are now considering implementing ERP systems to serve their unique business needs. Newly established small manufacturing enterprises also wish to implement ERP systems. This is indicated by the comment made by one of the ERP system consultants, who stated that small enterprises want systems that will help the enterprise to grow, and older enterprises want systems to support the management of business operations. The second ERP system consultant made a comment similar to that made by the first ERP system consultant:

"*… revaluate your need for a more advanced system such as ERP at a later, more mature stage of your enterprise growth*."

- Across the spectrum of small manufacturing enterprises surveyed, very small, small and medium sized manufacturing enterprises wish to implement and use ERP systems. The very small enterprises wish to grow with the ERP system in order to help manage changes, communications, and complexities of a growing enterprise. The medium size enterprises also want to implement ERP systems to assist their organisation to maintain the vast amount of business information. Small manufacturing enterprises want ERP systems to assist with the strategic alignment of their enterprises. Laukkanen, et al. [2007] explore enterprise size and adoption of ERP systems and conclude that small enterprises lack competency and the information required to make use of ERP systems and should be given training. Although Laukkanen, et al. [2007] explore the fine detail of ERP system adoption by enterprises; it would be beneficial to explore the relationship of enterprise size and acceptance of an ERP system with the acceptance factors identified in this study.

8.5 SIGNIFICANCE AND CONTRIBUTION OF RESEARCH

In Section 1.6: Rationale behind study, the contribution and importance of this study to two key audiences was discussed. The results of the study indicate that the research findings are important and can contribute to the community within information systems research, particularly for researchers whose area of research expertise focuses on ERP introduction, selection, acquisition, implementation, technology acceptance and technology adoption. The research findings could also be of interest to ERP system vendors that wish to capture the small enterprise market.

The findings from this study are important to the academic body of knowledge in that:

- The findings offer exploratory insight into the acceptance of ERP systems by small manufacturing enterprises.
- The findings offer an understanding of how small manufacturing enterprises perceive ERP systems.
- The findings offer an understanding of the requirements for ERP system use by small manufacturing enterprises.

- The findings from this study could aid in the conceptualisation of new, as well as extended and improved, models and frameworks of technology acceptance of ERP systems for small manufacturing enterprises.
- This study serves as a basis for further research initiatives in different industries, in both developing and developed economies, to stimulate in-depth inquiry.

ERP system developers and vendors may also benefit from this study, as they seek to refine their strategies to capture the small enterprise market. It is recommended that small manufacturing enterprise ERP system vendors should apply some, if not all of the results of this study, in conjunction with results from related research findings (Chapter 2) to ensure the active acknowledgment of small manufacturing enterprises and ERP system acceptance factors. The research findings from this study are important to the ERP system development and ERP system sales domain, in that:

- The findings offer insight into the acceptance of ERP systems by small manufacturing enterprises.
- The findings offer an understanding of how small manufacturing enterprises perceive ERP systems and brand recognition, as is evident from the findings that a good brand promotes the purchase of ERP systems.
- The findings offer an understanding of the requirements for ERP system use by small manufacturing enterprises.
- It offers better categorisation and formalisation of understanding ERP system acceptance factors in terms of strategic, business, technical and human factors. The list of acceptance factors should help vendors to ensure that these are categorically *checked* before dissatisfied customers discontinue their services.

The knowledge gained from this study in essence resulted in an alternate comprehension of technology acceptance theory and small manufacturing enterprise ERP system requirements elicitation.

8.6 LIMITATIONS OF RESEARCH

Research will always have some shortcoming [Hofstee, 2006]. Each research strategy can lead to unique results, depending on how the research methodology was pursued. If the chosen research methodology were to be carried out under different circumstances, different results would most probably emerge. The limitations of the research methodology adopted in this study are as follows:

- One of the challenges of survey research strategy is generalisability [Oates, 2006]. The number of participating small manufacturing enterprises was limited. The number of participants could have included more sample subjects from different manufacturing sectors and across all nine provinces of South Africa. This would have provided more representativeness and generalisability of findings across manufacturing sectors and across the country.
- The timeline for carrying out this survey could have been longitudinal, which would have allowed for the measurement of acceptance factors when small manufacturing enterprises intending to implement an ERP system actually implemented the ERP system (some enterprises were in the process of acquiring ERP systems). The longitudinal study would presumably provide further insight and distinctive comparisons of findings. The scope and length of a Master's study does not, however, make it feasible for a longitudinal study to be done.

8.7 RECOMMENDATIONS FOR FURTHER WORK

As indicated in Chapter 1, it was anticipated that the results of this exploratory study could serve as a basis for further comparative investigations in various countries and in various core economic industries. Further in-depth, cross-sector and inter-industry studies should reveal additional results and expand on current results, thus providing a detailed analysis of acceptance factors that need to be considered. A number of recommendations for future work can be made, i.e.:

- Refine and improve the proposed acceptance factors.
- Correlate the proposed acceptance factors with the adoption factors.

- Validate the proposed acceptance factors.
- Conduct case studies on the application of acceptance factors.
- Match individual acceptance to enterprise acceptance.
- Analyse various moderating effects on acceptance factors.
- Research the aspect of fun and the use of ERP systems.
- Collaborative and multi-disciplinary research exploring the acceptance of ERP systems.
- Use of alternative research strategies, such as case studies and usability experiments.

The acceptance factors proposed can be refined by considering issues as diverse as the complexities of inter-organisational relationships, gender differentials of small manufacturing enterprises and ERP system use, small manufacturing enterprise maturity and ERP system use and issues associated with adaptability, expandability and ease of access across multi-faceted platforms such as mobile devices. Further research is recommended to assess acceptance of ERP systems amongst start-up and younger small enterprises versus more mature and longer-established small enterprises. The refinement and addition of new acceptance factors will ultimately foster an enhanced understanding of the phenomenon under investigation.

The emphasis of this study was on technology acceptance and, as such, technology adoption was only briefly explored. A recommendation is to conduct research correlating these technology acceptance factors to technology adoption factors. Furthermore, it may be beneficial to re-visit the assessment of the statements once the small manufacturing enterprises have implemented their ERP systems; this to measure if there are changes to agreement regarding acceptance of ERP systems.

It is suggested that further validation would improve the accuracy of the holistic understanding required in terms of acceptance of ERP systems by small manufacturing enterprises.

It is all very well to understand acceptance factors and translating this to models, frameworks, guidelines, policies and strategies in supporting acceptance of ERP system application in small enterprises. However, the real benefit is derived when this is applied to the real-world context. Real-world cases will support our understanding and reiterate the importance of the acceptance factors.

Because of the intricate dynamics of an enterprise, the different role players' views on ERP system acceptance would likely yield a more thorough analysis of enterprise acceptance of ERP systems. The complex inter-relation within the enterprise may yield new findings on ERP system dominance, power and control of use, particularly between managers/owners and employees.

This study concentrated on acceptance factors from two main perspectives: small manufacturing enterprises that have experience in using ERP systems; small manufacturing enterprises that have an expectation, but no experience in using ERP systems. It would be valuable to find out if the moderating effects of gender, age, experience and voluntariness (as explained in the UTAUT model) could be researched further. This should result in richer research results. For example, the acceptance factors of male-owned small manufacturing enterprises could be investigated in comparison to acceptance factors of female-owned small manufacturing enterprises. Another example could be to evaluate the young small manufacturing enterprises' views on ERP system acceptance in comparison to the views of those small manufacturing enterprises that are more mature.

The aspect of enjoyment and fun when using ERP systems in the context of small manufacturing enterprises may influence the acceptance of ERP systems.

Collaborative and multi-disciplinary research is warranted as it encompasses a number of multi-faceted disciplines and dimensions, such as: the socio-technological dimension with regard to human behaviour and the use of information technology; ERP system design, development and deployment; business use information technology; and industry use of information technology. It is the interpretivist researcher's belief that there is potential for a number of critical collaborative research scenarios that could be used to find unique perspectives on small manufacturing enterprise ERP system acceptance and assimilation. Acceptance and use of ERP systems by small manufacturing enterprises is a young research area and therefore offers a fresh opportunity for new and challenging research.

This study could have used in-depth case study research on small manufacturing enterprises and also set-up usability and user acceptance experiments to conduct user experience analysis of ERP system acceptance. Alternative research strategies and data generation methods could have provided insightful perspectives on the dynamic and subjective nature of technology acceptance.

8.8 CONCLUDING STATEMENTS

The findings gathered and discussed not only support the research objectives and questions addressed in this study, but also support literature that focuses on ERP system acceptance. An indication that small manufacturing enterprises have a positive and optimistic view of ERP system use exists. Small manufacturing enterprises that currently use ERP systems and those small manufacturing enterprises that intend to implement ERP systems want a system that can perform and work for them. A technically sound system does not necessarily translate to acceptance. The user ultimately enables system functionality. It is vital that the design, development, deployment, and maintenance done by small manufacturing enterprise ERP system vendors should be done in liaison with small manufacturing enterprises in order to achieve an increased level of acceptance and eventual adoption of ERP systems. The perspective of the end user determines the acceptance of using a system. ERP systems must provide the functionality required. All elements pertaining to acquiring and using ERP systems need to be carefully considered to ensure that ERP systems fulfill the specific planning and execution needs of the enterprise. The benefits of using an ERP system need to realise whilst challenges should be regarded as part of the process and not as an impossible barrier to overcome.

This study imparted valuable perspectives that contributed to the research domains of technology acceptance and use of ERP systems by small manufacturing enterprise. Although the diverse list of desirable acceptance factors, as presented in Table 34, may not be exhaustive, absolute or optimally applicable to all small enterprises across the various economic industries, this study is considered as a basis for more research.

The seemingly surreal interface between humans and computers will always be a contentious phenomenon for researches to investigate. Understanding the acceptance of technology is as much an art as a science. The more we understand about the dynamic interaction between user and system, the better researchers can intervene to harness and balance a profound engagement between system and user to ensure a productive and sustainable relationship.

The use of ERP systems will surely be dominated by large enterprise, but acceptance by small manufacturing enterprises could be dealt a considerable challenge if ERP system acceptance factors are not thoroughly understood. This negative ripple effect could hamper the adoption of

ERP systems when small enterprises grow into a large enterprise that require access to the benefits of complex and larger scale ERP systems.

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Appendices

APPENDIX A: RECRUITING RESEARCH PARTICIPANTS

A. Narration to get small manufacturing enterprises to participate:

Good day,

My name is Rubina Adam. I am student academic researcher from the School of Computing, University of South Africa. We are currently conducting research that focuses on small and medium manufacturing enterprises and the use of ERP systems to help run your enterprise.

*I would appreciate if I could visit your company in the coming week to have about **30 minutes** of your time to help fill out a questionnaire.*

It will be interview-based and we will assist you to complete the questionnaire, if you can provide us answers and opinions to the questions asked in the questionnaire. It does not matter whether you are currently using a particular ERP system. We would like to gather your opinions on what you may look at when considering purchasing such an ERP system.

The purpose of the study is to get a list of critical success factors that could influence the acceptance of ERP systems.

The benefit from participating means getting a copy of the findings at the end of the study to help you in your intention to purchase and use ERP systems. These factors can also help you review your decision in accepting and adopting current ERP systems.

When would it be suitable to meet?
[If agreement is reached]

Thank you for your willingness to participate. I look forward to meeting you, [Mr/Mrs name] on the [date] at [address]

Before I leave you, would you like me to call you with a reminder, before meeting?
Thank you! Have a lovely day further.

B. Narration to get ERP system consultants to interview:

Good day,

My name is Rubina Adam. I am an MSc researcher from the School of Computing, University of South Africa. We are currently conducting research that focuses on small and medium manufacturing enterprises and the use of integrated business managements systems to help run their enterprise.

The purpose of the study is to get a list of critical success factors that could influence the acceptance of ERP systems.

I would appreciate if I could interview you in the coming two weeks for approximately ***30 minutes*** *of your time to help me understand acceptance factors of ERP systems.*

The benefit from participating means getting a copy of the findings at the end of the study to guide your strategy in marketing ERP systems to small manufacturing enterprises.

When would it be suitable to meet?
[If agreement is reached]

Thank you for your willingness to participate. I look forward to meeting you, [Mr/Mrs name] on the [date] at [address]

Before I leave you, would you like me to call you with a reminder, before meeting?
Thank you! Have a lovely day further.

APPENDIX B: RESEARCH QUESTIONNAIRE

Research Questionnaire

This research questionnaire is in support of fulfilling the Masters Research study:

The Acceptance of Enterprise Resource Planning systems by
Small manufacturing enterprises in South Africa

Rubina Adam
MSc Information Systems
School of Computing
UNISA

2009

Supervisors:

Prof Paula Kotzé

Prof Alta van der Merwe

Unique Q. No.	
Name of Participant	
Contact Information	

Before you begin to answer

Important information to note before proceeding to complete the questionnaire

A. About the study

Enterprise Resource Planning (ERP) systems are increasingly introduced in small and medium enterprises. ERP systems are holistic, integrated business management systems providing constant information across and within various business functions. These business management systems such as customer relationship management, supplier relationship management, accounting and financial management assist companies to record, manage and access business information on-demand and periodically.

I am investigating factors influencing the acceptance of ERP systems by small manufacturing enterprises in South Africa.

The outcome of this study should help fellow academics and ERP system vendors to understand critical factors to consider when introducing such systems in small manufacturing enterprises.

B. Your participation in the study

If your small enterprise (21 to 50 employees, annual turnover between R 5 million and R 13 million)[2] is using or intending to use an ERP system, this questionnaire offers an opportunity to express your views. Researchers will be able to inform ERP system vendors your needs to use an ERP system.

The questionnaire should not take more than **30** minutes of your time to complete.

2: Small manufacturing companies according to National Small Business Amendment Bill 2003, Republic of South Africa

C. Confidentiality and publication of information

The information you provide will be treated with strict confidentiality. It is possible that anonymised summarised results will be used for publication in research conferences and journals. Any personal references to you or your small enterprise will be made anonymous. You are requested to sign the "research participant's permission" form in the next section to confirm your willingness to participate and that you understand that your information will be treated in confidence. A copy of this form will be given to you for your own record.

Research Participant's Permission

Signature to confirm participation in research study

I, **Rubina Adam** hereby state that I will not use the information provided in this questionnaire for any other purpose other than the stated purpose, that being for use during analysis and discussion of findings. I will respect the information with strict confidentially and anonymity.

_____ _____

Signature *Date*

I _____ hereby voluntarily give my permission to participate in this research study as explained to me by the researcher, **Rubina Adam**. The nature, objective, confidentiality and publication of information have been explained to me and I understand them.

_____ _____

Signature of Participant *Date*

_____ _____

Witness *Date*

For any queries, please contact Rubina Adam at:

rubina.adam@gmail.com

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Procedure for completing questionnaire

Instructions for completing the questionnaire

The following guidelines will assist you in answering the questions to follow:

- It is important that you complete the questionnaire by answering ALL questions with sincere honesty. If you feel uncomfortable in answering a particular question you are welcome to indicate this.

- Your answers should accurately reflect your views. This will help provide a credible view of factors that should be taken into account when promoting ERP systems in small manufacturing enterprises.

- The questionnaire consists of **three** sections.

- Section A: **Background information**
- Section B: **Experiences of using ERP systems**
- Section C: **Expectations for using ERP systems**

> **IMPORTANT:**
> **Section A** needs to be filled in by ALL participants
> **Section B** needs to be filled in by participants who have experience in using ERP systems.
> **Section C** needs to be filled in by participants who have no experience in using ERP systems.

- Note the instructions for specific type of questions carefully. Instructions will be provided below the main heading of the section and also after a specific type of question. This will guide you to answer the questions more efficiently and effectively.

Section A: Background Information

Place a ✓next to the answer that best describes your response.

1. What would best describe the manufacturing sector in which your small manufacturing enterprise operates?

Food Products, Beverages and Tobacco Products	
Textiles, Clothing and Leather	
Wood and Products of Wood and Cork, except Furniture	
Articles of Straw and Plaiting Materials	
Paper & Paper Products	
Publishing, Printing and Reproduction of Recorded Material	
Refined Petroleum, Coke and Nuclear Fuel	
Chemicals and Chemical Products (incl. Pharmaceuticals)	
Rubber and Plastic Products	
Non-Metallic Mineral Products	
Basic Metals, Fabricated Metal Products, Machinery & Equipment	
Office, Accounting and Computing Machinery	
Electrical Machinery and Apparatus (n.e.c)	
Radio, Television and Communication Equipment and Apparatus	
Medical, Precision and Optical Instruments, Watches and Clocks	
Transport Equipment	
Furniture	
Manufacturing n.e.c	
Recycling	
Other: (Please specify if applicable) _____	

2. How many years has your enterprise been operating?

> 20 years	
16-20	
11-15	
6-10	
1-5	
< 1 year	

3. How many employees do you have?

Large	More than 200	
Medium	51-200	
Small	21-50	
Very Small	6-20	
Micro	1-5	

4. Are you familiar with the following ERP systems?

	Yes	**No**
SAP Business One		
Sage Pastel Suite		
Pastel Evolution		
QuickBooks Enterprise Systems		
Sage Accpac ERP by MISys		
InfoR ERP		
Openbravo		
Compiere		
Microsoft Dynamics		
Syspro		
Other: (Please specify if applicable) _____		

5. Is your enterprise currently using any ERP system?

Yes		**No**	

If you have answered **Yes**, answer question **6** to follow or else proceed to answer question **9.**

6. What sort of ERP system(s) is/are implemented?

Customer relationship	**Comments**
Name: _____	
In use since: _____	
Approximate number of users: _____	

Supplier relationship	**Comments**
Name: _____ In use since: _____ Approximate number of users: _____	

Manufacturing execution	**Comments**
Name: _____ In use since: _____ Approximate number of users: _____	

Account and Financial Management	**Comments**
Name: _____ In use since: _____ Approximate number of users: _____	

Human Resource	**Comments**
Name: _____ In use since: _____ Approximate number of users: _____	

Business Intelligence/Analytics	**Comments**
Name: _____ In use since: _____ Approximate number of users: _____	

Other **(Please specify if applicable)**	**Comments**
Notes: **If there is more than one system, please number corresponding responses to the specific system e.g.** Name: 1. Projection In use since: 1. 2005 Approximate no. of users: 1. 3 users	**Comments:** We use Projection to assist in managing new product development ideas.
Name: _____ _____ _____ _____ In use since: _____	

_____ _____ _____ _____ Approximate number of users: _____ _____ _____ _____ _____	

7. What would you rate the average computer skill levels of users of ERP systems?

Excellent	Good	Neither Good nor Bad	Bad	Dismal

8. Which of the following best describes features that an ERP system should deliver? You can ✓more than one choice, if applicable.

Customer relationship management	
Supplier relationship management	
Manufacturing execution management	
Financial management	
Human resource management	
Business intelligence / Analytics	
Other: (Please specify if applicable) _____	

9. Please rank the following reasons on why you would use an ERP system in order of **most important (1)** to **least important (13)**

Industry necessitates the use of an ERP system	
Advance business operations	
Manage complexity and cost efficiently adapt to changes	
Competition in industry	
Enables business growth and strategic alignment	
Promote transparent governance and improve operational efficiency	
Manage cash, liquidity, and financial risk better	
Manage the workforce through rapid change	
Better business planning and consolidation	
Improve stakeholder relationship and trust	
Timely analytical-supported decision-making ability	
Cost saving through optimisation of IT (information technology)	
Follow industry best practices	

10. What would you say are the **three most important factors** that would influence your decision to purchase an ERP system for your enterprise?

Low total cost of ownership – maintenance, upgrades, consultation, training, etc	
Provision of functionality on-demand with the ability to "switch on and switch off" functionality	
Integration with other business systems	
Accessibility: anytime, anywhere, including mobile and web accessibility	
Quick implementation time	
"Start and go" self-learning – minimal training costs	
Long term investment sustainability	
Intelligent aware – helps alerts to changes in market forces	
User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done	

11. Would brand reputation influence your decision to use an ERP system?

Agree		**Disagree**	

If you have experience in using ERP systems, please proceed to **Section B**.

If you do not have experience in using ERP systems, please proceed to **Section C**.

NOTE:
Answer **section B** only if you have experience in using ERP systems.

Section B: Experiences using ERP systems

Place a ✓in the space provided next to the relevant view

12. In general, our enterprise has supported the use of an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

13. The interface of an ERP system should be clear and understandable.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

14. Using our ERP system enables us to accomplish tasks more quickly.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

15. People who are important to us think we should use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

16. We have the resources necessary to use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

17. People who influence our behaviour think we should use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

18. The management of our enterprise has been helpful in the use of our ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

19. Using an ERP system increases our productivity.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

20. Our ERP system is not compatible with other systems we use.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

21. We have the knowledge necessary to use our ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

22. A specific person (or group) is available for assistance with our ERP system's difficulties.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

23. Learning to use our ERP system is easy for us.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

Additional Comments

Please share any further comments that will help us understand factors influencing the acquisition, acceptance and adoption of ERP systems by small manufacturing enterprises in South Africa

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NOTE:
Answer **section C** only if you have no experience in using ERP systems.

Thank you for your time and invaluable participation

Section C: Expectations for using ERP systems

Place a ✓ in the space provided next to the relevant view

24. We may find an ERP system useful in our enterprise.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

25. It should be easy for us to become skilled at using an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

26. If we use an ERP system, it may increase our chances of becoming more profitable.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

27. We should find an ERP system easy to use.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

28. People who influence our behaviour think we should use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

29. The interface of an ERP system should be clear and understandable.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

30. ERP systems may not be compatible with other systems we use.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

31. We have the resources necessary to use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

32. We have the knowledge necessary to use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

33. People who are important to us think we should use an ERP system.

Strongly Agree	Agree	Neither disagree nor agree	Disagree	Strongly Disagree

Additional Comments

Please share any further comments that will help us understand factors influencing the acquisition, acceptance and adoption of ERP systems by small manufacturing enterprises in South Africa

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Thank you for your time and invaluable participation

APPENDIX C: RESEARCH INTERVIEW

Research Interview

This research interview is in support of fulfilling the Masters Research study:

The Acceptance of Enterprise Resource Planning systems by
Small manufacturing enterprises in South Africa

Rubina Adam
MSc Information Systems
School of Computing
UNISA

2010

Supervisors:

Prof Paula Kotzé

Prof Alta van der Merwe

Unique I. No.	
Name of Participant	
Contact Information	

Before the Interview

Important information to note before the start of the interview

A. About the study

Enterprise Resource Planning (ERP) systems are increasingly introduced in small and medium enterprises. ERP systems are holistic, integrated business management systems providing constant information across and within various business functions. These business management systems such as customer relationship management, supplier relationship management, accounting and financial management assist companies to record, manage and access business information on-demand and periodically.

I am investigating factors influencing the acceptance of ERP systems by small manufacturing enterprises in South Africa.

The outcome of this study should help fellow academics and ERP system vendors to understand critical factors to consider when introducing such systems in small manufacturing enterprises

B. Your participation in the study

The interview should not take more than **1 hour** of your time to complete.

C. Confidentially and publication of information

The information you provide will be treated with strict confidentiality. It is possible that anonymised summarised results will be used for publication in research conferences and journals. Any personal references to you or your company will be made anonymous. You are requested to sign the "research participant's permission" form in the next section to confirm your willingness to participate and that you understand that your information will be treated in confidence. A copy of this form will be given to you for your own record.

Research Participant's Permission

Signature to confirm participation in research study

I, **Rubina Adam** hereby state that I will not use the information provided in this interview for any other purpose other than the stated purpose, that being for use during analysis and discussion of findings. I will respect the information with strict confidentially and anonymity.

_____ _____

Signature *Date*

I _____ hereby voluntarily give my permission to participate in this research study as explained to me by the researcher, **Rubina Adam**. The nature, objective, confidentiality and publication of information have been explained to me and I understand them.

_____ _____

Signature of Participant *Date*

_____ _____

Witness *Date*

For any queries, please contact Rubina Adam at:

rubina.adam@gmail.com

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Procedure for interview

Instructions for interview

The following guidelines will assist you in answering the questions to follow:

- It is important that you answer ALL questions with sincere honesty. If you feel uncomfortable in answering a particular question you are welcome to inform the interviewer.

- This will help provide a credible view of factors that should be taken into account when introducing ERP systems to small manufacturing enterprises.

Questions to ask

---

1. In your experience, how would you describe the acceptance, acquisition and/or adoption of ERP systems by small manufacturing enterprises in South Africa?
2. What are the positive and negative issues that can be ascertained from user evaluation surveys or interviews done with small manufacturing enterprises?
3. What can you comment about the responses from the small manufacturing enterprises when asked to rank the ERP system acceptance factors?
4. In your opinion, when is a small manufacturing enterprise ready to accept ERP systems?
5. Which factors, in your view, are more important than any other factor influencing acceptance of ERP systems?
6. Is there anything you would like to add?

Please rank the following reasons on why you would use an ERP system in order of most important (1) to least important (13)

1.	Advance business operations
2.	Better business planning and consolidation
3.	Enables business growth and strategic alignment
4.	Promote transparent governance and improve operational efficiency
5.	Manage complexity and cost efficiently adapt to changes
6.	Timely analytical-supported decision-making ability
7.	Manage cash, liquidity, and financial risk better
8.	Improve stakeholder relationship and trust
9.	Cost saving through optimisation of IT (information technology)
10.	Industry necessitates the use of an ERP system
11.	Competition in industry
12.	Manage the workforce through rapid change
13.	Follow industry best practices

What would you say are the three most important factors that would influence your decision to purchase an ERP system for your enterprise?

1.	Provision of functionality on-demand with the ability to "switch on and switch off" functionality
2.	Low total cost of ownership – maintenance, upgrades, consultation, training, etc
3.	User experience should be satisfying – using the ERP system should be simple, easy to use, quick and meet expectation to get the work done

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Thank you for your time and invaluable participation

APPENDIX D: SMALL MANUFACTURING ENTERPRISE RESEARCH PARTICIPANTS

Legend	Experiences of using ERP systems (n=7)	Expectations for using ERP systems (n=9)	* Female Owned

No	Pseudo SME name	Owner	Years in Operation	No. of fulltime employees	Location	Sector	Manufactured Products
1.	**Wire Worx**	Mr. Geyer	1-5	21-50	Silverton	Multi-industry: Furniture Basic metals, fabricated metal products, machinery and equipment	Basic wire vessels such as buckets, holders, jugs, vases, small ornaments, frames, tins signs and indoor and outdoor wrought iron furniture
*2.	**Fresh Furniture**	Mrs. Portia	1-5	51-200	One factory in Pretoria North and one factory in Botswana	Furniture	Build and repair school furniture, such as desks, tables, chairs
3.	**No. 1 Upholstery Services**	Mr. Kwando	1-5	6-20	Silverton	Furniture	Upholster, restore, design and make new furniture
*4.	**Made in Africa Creations**	Mrs. Mbuli	11-15	6-20	Brooklyn	Textiles, Clothing and Leather	Women's evening and function garments, small beaded accessories and embellishments to accompany garment

- **Continued on next page** -

5.	**Izindo Cleaning CC**	Mr. Baloyi	1-5	51-200	Pretoria Industrial	Chemicals and Chemical Products (incl. Pharmaceuticals)	Cleaning detergents and hygiene products to sell in bulk quantities to small businesses such guest houses, catering companies, restaurants, car wash services, and general public
***6.**	**In and Out of the Box Packaging**	Mrs. Oosthuizen	1-5	21-50	Irene (operates in Johannesburg, Cape Town and Durban for sales of manufactured goods)	Paper & Paper Products	Paper boxes, wrapping paper, ribbon, gift bags, paper cards, paper gift tags, custom-made paper products on request
7.	**Mike's Metal Gates CC**	Mr. Naidoo	11-15	21-50	Hammanskraal	Basic Metals, Fabricated Metal Products, Machinery & Equipment	Wrought iron gates, perimeter devil forks fencing, stair case railing, window frames, burglar gates, etc, any metal and steel frame requirements depending on customer specifications
8.	**Mark it! Rubber Stamps and Engraving services Co.**	Mr. Antonio	> 20	21-50	Pretoria West	Rubber and Plastic Products	Self inking, plain rubber, special application rubber stamps, customized made to customer needs and laser engraving services
9.	**The Café - Bakery on the Corner**	Mr. Nkhosi	16-20	6-20	Pretoria Central	Food Products, Beverages and Tobacco Products	Various baked goods such as pastries, pies, cakes, breads, deli snacks, café style coffee and fresh rooibos tea, fruit juice, smoothies and milkshakes, etc
10.	**Stylish & Grand Metal Craft**	Mr. Smith	6-10	6-20	Roodepoort	Basic Metals, Fabricated Metal Products, Machinery & Equipment	Steel and wrought iron balustrades, handrails, gates, and metal frames, cater for up-market projects

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11.	**Max Protect Security Gates and Fences CC**	Mr. Jabulani	11-15	6-20	Lyttelton	Basic Metals, Fabricated Metal Products, Machinery & Equipment	Security gates and fencing for perimeter and entry protection, inside and outside window burglar gates, Also works on the automation of gates.
12.	**Living Outside Furniture**	Mr. Robbins	11-15	21-50	Centurion	Furniture	High quality timber garden furniture and accessories: chairs, barstools, loungers, loveseat, tables, benches, bridges for small ponds, paneling, bird feeders, arches, small gazebos, swings, wooden patio decks, etc
***13.**	**Organic Beauty from the Earth Products**	Mrs. Mulumale	6-10	6-20	Rietvlei	Chemicals and Chemical Products (incl. Pharmaceuticals)	Shampoo and conditioners, herbal aroma therapy and glycerine based soaps, bath crystals, bath beads, foam bath liquid, healing massage and tissue oil, hand cream and body moisturising lotions and natural bees wax lip balm
***14.**	**Spring Garden Studio**	Mrs. Maple	1-5	21-50	Waterval	Multi-industry: Furniture Basic metals, fabricated metal products, machinery and equipment	Wrought iron garden furniture sets, large garden clay pots, custom-made water features, bird feeders, plant frames, picnic tables, etc
***15.**	**A Stitch in Time Sewing Services**	Mrs. Mtsweni	1-5	6-20	Mamelodi	Textiles, Clothing and Leather	Contracted for any requested sewing. Specialises in manufacturing for events and functions: drapery, table cloths, place mats, napkins. Also does curtains and duvets for hotels, guest houses and private clients in Pretoria and Johannesburg
***16.**	**Frozen Desserts Co.**	Ms. Rose	> 20	6-20	Pretoria Central	Food Products, Beverages and Tobacco Products	Whole milk ice cream in a variety of flavors, ice cream cakes, wafer ice cream sandwiches, fresh fruit juice lollipops

APPENDIX E: ERP SYSTEM CONSULTANT RESEARCH PARTICIPANTS

No.	Pseudo consultant name	Title	Company	No. of years of experience
1.	Mr. Mathews	Sales Executive	QuickBooks, distributed and supported by EasyBiz (PTY) Ltd	6
2.	Mr. van Zyl	Sales Executive	Softline Pastel	8

APPENDIX F: INTERVIEW RESPONSES

1. Interview One

The first interview was conducted with Mr. Mathews, sales executive and ERP system consultant at QuickBooks. The questions asked to Mr. Mathews are listed in Table 1. The answer to each of the questions asked is presented in the corresponding sub section, as indicated in Table 1.

Table 1: Interview one questions

Section	Question No.	Statement
1.a	1.	In your experience, how would you describe the acceptance, acquisition and/or adoption of ERP systems by small manufacturing enterprises in South Africa?
1.b	2.	What are the positive and negative issues that can be ascertained from user evaluation surveys or interviews done with small manufacturing enterprises?
1.c	3.	What comments can you offer about the responses from small manufacturing enterprises when asked to rank the ERP system acceptance factors?
1.d	4.	In your opinion, when is a small manufacturing enterprise ready to accept an ERP system?
1.e	5.	Which factors, in your view, are more important than any others in influencing acceptance of ERP systems?
1.f	6.	Is there anything you would like to add?

1.a View on small manufacturing enterprise ERP system acceptance

Mr Mathews responded, "… small manufacturing enterprises in South Africa have not reached the maturity of medium and large manufacturing enterprises to purchase and use specialised software such as ERP. The smaller companies can suffice using standard off the shelf accounting and payroll packages. Some interests are there, but for niche manufacturing sectors markets that

focus on specialised and specific high-tech manufacturing processes, such as machinery and equipment sectors."

1. b User evaluations

Mr Mathews' response to this question was, "At first the users struggle to use the software in the beginning, they have to get use to the new terminology especially when they find error messages that they don't understand. We have a support line where users can call to enquire for assistance and so far we have managed to assist our clients telephonically."

1. c Comments on acceptance factors ranking

Mr Mathews commented:
"People get systems for better management, for formalising work, for efficient and effective operation, for being one-step-ahead and aware of changing markets. So, yes I can agree with the rankings.

Although, if I were to comment on number 12, that is 'follow industry best practises' that is one of the reasons we find our small enterprises prefer, to follow what is generally accepted best business practises. We emphasize that we are not changing the way you run your business, but we want you to follow recommended processes that will have grow and sustain your enterprise in the long run. We demonstrate and share stories of case studies to explain to our clients the benefits of using an ERP system.

Everyone wants flexibility and only what he or she wants. That is a challenge with integrated systems as you have prerequisites for work that you would like to do, and that is something we have to train users to remember.

Cost, everyone wants the best for less and setting up and maintenance is a costly business. Therefore, for the expense made, one should note that they are getting the best out there.
ERP systems, particularly for large enterprise is synonymous with complexity. We have tried to ensure our interfaces for ERP systems for small manufacturing enterprises are easy. We run through several demonstrations and training sessions to familiarise the users with the system

look, feel, and navigation and tell them that everything takes time to adjust, just like learning the gears of a car. We are aware that the detailed inputs can be seen as 'too much and confusing but once again we emphasize the benefits of a complete system and not just for one task or activity for the particular user.

We are also in the view that with the developments we are seeing on the Internet, the option for using hosted web based ERP systems is becoming more and more exciting. Global search facilities, like Google, on-demand reporting, dashboard styles and indicators, real time analysis is something to consider. We are excited at the opportunity for mobile, anywhere, anytime access to the business."

1.d Small manufacturing enterprise readiness to accept ERP systems

Mr Mathews emphasized, "If you can't handle your business using the basics and you have a growing and ever expanding enterprise, let us help you to decide if you are ready for a new switch. We will go through a process to assess readiness. Why spend when you are not yet ready to explore the full potential of an ERP system."

1.e Most important factors influencing ERP system acceptance

Mr Mathew's response: "It works and works well than any other stand alone system. Whether it is user friendly, complex, if it gets the job done, I think it should be acceptable. When it does not work, that is the problem. No one likes a system with bugs."

1.f Additional comments from consultant

Mr Mathews commented: "Using systems such as ERP is a mind shift. There are lots of changes involved. Switch over to the new system can cause a lot of anxiety and confusion but what people need to realise is that they need to give the system a chance. I believe if the users actively attend training, use the system on a daily or near daily basis, it will become intuitive and 'as easy as pie' to work with."

2. Interview Two

The second interview was conducted with Mr. van Zyl, sales executive and ERP system consultant at Softline Pastel. The questions asked to Mr. van Zyl are listed in Table 2. The answer to each of the questions asked is presented in the corresponding sub section, as indicated in Table 2.

Table 2: Interview two questions

Section	Question No.	Statement
2.a	1.	In your experience, how would you describe the acceptance, acquisition and/or adoption of ERP systems by small manufacturing enterprises in South Africa?
2.b	2.	What are the positive and negative issues that can be ascertained from user evaluation surveys or interviews done with small manufacturing enterprises?
2.c	3.a	What comments can you offer about the responses from small manufacturing enterprises when asked to rank the ERP system acceptance factors?
	3.b.	Why do you say the maturity of the small enterprise can influence the acceptance of ERP systems?
2.d	4.	In your opinion, when is a small manufacturing enterprise ready to accept an ERP system?
2.e	5.	Which factors, in your view, are more important than any others in influencing acceptance of ERP systems?
2.f	6.	Is there anything you would like to add?

2. a View on small manufacturing enterprise ERP system acceptance

Mr van Zyl answered “Very slow uptake. People and enterprises are becoming more IT aware nowadays and want to get the ‘system’ to manage and run their enterprise. However, one must be careful of unscrupulous vendors, gift-wrapping systems that do not suit the small enterprise.

Small enterprises must be smart and spend wisely. They must know what they are buying themselves into."

2. b User evaluations

Mr van Zyl responded: "we get numerous calls every day, with comments, suggestions, recommendations, complaints and questions such as 'Why doesn't the system do this?', 'Why does that error message come?' We value client relationships and therefore listen to our clients' feedback. Where we are unable to meet client expectation and requirements, we have to admit this and consider for future development for generic systems. Sometimes customisation impacts upgrades, so we have to decide accordingly to meet requests or not fulfil."

2. c Comments on acceptance factors ranking

Mr van Zyl said, "If you ask any of our clients' why did you buy this system? They will tell you to become a better business, to grow, to sustain, to manage, to maintain quality, etc. That is why I agree with the rankings and once again, this may change depending on the maturity of the small enterprise."

A responding question was asked: "Why do you say the maturity of the small enterprise can influence the acceptance of ERP systems?"

Mr van Zyl responds to the follow-up question, "The more mature the enterprise, the demands and requirements change. The needs of a younger enterprise may be to grow and sustain their enterprise and the more mature enterprise with a number of relationships and interactions would like to manage these complexities."

"Looking at these non-functional factors as you have indicated here, cost is [by] far one of the most important factors. Then again, many small manufacturing enterprises we deal with look at the quality and performance of the system and cost is relative. Small manufacturing enterprises pay for good service and not just the product. We therefore emphasise the total solution package from cost, usability, functionality, training, service and meeting user requirements. The experience of using the system is just as important. We do not want users to feel using the system

is a tedious administration bore. We invest a lot of research and development in testing the overall functionality and user experience of our product."

2. d Small manufacturing enterprise readiness to accept ERP systems

Mr van Zyl gives his opinion: "When they are ready to use it. We had a number of cases where users would switch to the old way of doing things, you will find spreadsheets and information not captured on the system and this is not accepting or adopting the system. We find that a proper implementation that is done in parallel will ease in users to adopt using the system from their previous way of conducting business. It is a process in itself, change management."

2. e Most important factors influencing ERP system acceptance

Mr van Zyl reaffirms from previous responses: "As I have mentioned, if the system is there and it's not in use, it's not going to help any efficiency, effectiveness, and managing issues. What is the essence of acceptance and adoption is getting use to it [the ERP system]. Yes, it is routine, it's the standard processes, but it works. It is the way to go and that is what enterprises must understand, doing things haphazard is not being flexible, it is threading dangerously. Structure and consistency is important."

2. f Additional comments from consultant

Mr van Zyl said, "People look at ERP and think it's a whole, complete solution to their enterprise needs. This may not necessarily be true. It will attempt to integrate but enterprises must realise that certain processes cannot be automated and be performed using the system. Each enterprise has unique requirements and systems with functionality and features make for some substantial investment. So engage carefully with consultants to ensure most if not all your business requirement specifications is catered. If a simpler, cheaper system can perform what is required then consider the option and revaluate your need for a more advanced system such as ERP at a later, more mature stage of your enterprise growth."