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**TOWARDS A MODEL FOR ERP USER ADOPTION IN SMMEs:
AN
EMERGING ECONOMY ANALYSIS**

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MASTERS DEGREE IN INFORMATION SYSTEMS
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James 1:17 "Every good and perfect gift is from above, coming down from the Father of the heavenly lights who does not change like shifting shadow."

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Abstract

Small, micro and medium-sized enterprises (SMMEs) are the breeding ground for entrepreneurs, the future of emerging economies and the driving force in the global economy. A successful SMME sector holds numerous benefits for an emerging economy such as South Africa. Due to the large growth in SMMEs globally, Enterprise Resource Planning (ERP) vendors are developing products to cater for the ERP SMME sector. ERP systems provide SMMEs with a strategic tool which potentially improves their business processes, increases competitiveness and provides them with the opportunity to compete globally and sell their products internationally. While ERP systems provide an organisation with various benefits, the successful implementation of ERP systems is a challenge.

The way ERP systems are perceived, treated and integrated within a business plays a critical role in the successful adoption of the system. Yet a new ERP system is seen as a burden to first-time users, and research has proven that social factors determine the successful usage of an ERP system. A limited amount of research has been done to compare the implementation practices of developed economies with those of emerging economies. While much research has been published to facilitate ERP implementation in large organisations, research in SMMEs still lags behind. SMMEs differ from large organisations in that they often lack the large amount of resources and skills required for an ERP implementation.

Hence this research identifies user constraints faced during an ERP implementation in SMMEs. The SMMEs selected are in South Africa, an emerging economy. Research methods included grounded theory to add research rigour and action research to add immediate benefit to the organisation studied. This thesis shares the findings obtained through qualitative in-depth case studies. Two action research cycles have been conducted and findings of these research cycles are presented. Conditions and experiences unique to medium-sized organisations within an emergent economy are also shared.

The outcome of this research presents a model of categories and the relationships between them. The theory aims at supporting and enriching the existing body of knowledge on ERP implementations in emerging economies, more particularly for SMMEs in a South African context. ERP implementation and user adoption needs to be managed to ensure the success of these implementations. It is hoped that this model presented will be able to assist other ERP implementations in SMMEs within emerging economies in ensuring the success of these implementations.

1. Introduction

Various forms of research have attempted to study the adoption (means of getting users acquainted with a new system) of ERP (Enterprise Resource Planning) systems from the organisational, technical and user perspectives. ERP is one of the core business applications of most companies. ERP functionality normally covers finance, accounting (general ledger, accounts payable and accounts receivable), sales or customer order management, operations management, purchasing, and human resource management (Hestermann, Anderson, & Pang, 2009). While organisations all hope to reap the benefits of ERP systems, they must first understand the impact that the implementation will have on their employees (Chang, Cheung, Cheng, & Yeung, 2008). ERP system implementations in a global environment can be problematic due to different country cultures and the internal enterprise culture. When a Western-developed ERP system is implemented in an emerging economy where the culture differs from that of the developer, the implementation may require localisation in order to be successful (Srivastava & Gips, 2009).

1.1 The importance of SMMEs and emerging economies

According to the United Nations (2007), emerging economies will grow to contribute 50 percent of the world's economy within the next 25 years which will make developed economies increasingly dependent on emerging economies. A majority of the world's emerging economies indicate that small, micro and medium-sized enterprises (SMMEs) will be the predominant enterprise size for years to come as these play a key role in economic growth and development (Newberry, 2006). SMMEs are also seen as the breeding ground for entrepreneurs and the driving force in the global economy. Therefore, because of the economic and social importance of SMMEs, governments worldwide are putting development of their SMME sector high on their agenda (Matthews, 2007).

The formal definition of an SMME is not universal, and differs in each country. According to the South African National Small Business Amendment Act of 2003, an SMME can be defined by its size, annual turnover and gross asset value (Republic of South Africa, 2003). These characteristics will clearly differ in different countries and economies. The problems faced by SMMEs in emerging economies need to be researched to ensure the success of these economies.

1.2 The importance of ERP Systems

There are significant weaknesses and gaps in the information systems used by SMMEs. SMMEs in developing economies lack information management and have little or no systems and procedures in place (Van der Walt, 2004). Research has shown that many SMMEs fail within the first three to five years as a result of these weaknesses. The need for all business processes to be aligned and implemented as one solution is increasing (Huang & Palvia, 2001). ERP systems are seen to be the solution to these problems and provide SMMEs with the opportunity to align and integrate all business processes and units into one information system (Moon, 2007). ERP systems include business processes from finance, accounting, sales, operations management, purchasing, and human resource management (Hestermann et al., 2009). An ERP system can

also provide SMMEs with a strategic tool which could give them a global competitive advantage (Esteves, 2009). At the same time, ERP vendors have realised that the next area of growth lies within the SMME sector (Laukkanen, Sarpola, & Hallikainen, 2007). Therefore they are customising their products to cater for the growing demand in the SMME sector.

The nature of the technology-mediated organisational change undertaken during an ERP implementation is complex and lengthy (Volkoff, Strong, & Elmes, 2007). Hence the implementation requires high quantities of resources and entails high risks (Carvalho, Johansson, & Manhães, 2010). Due to resource poverty, the adoption of ERP systems holds a greater risk to SMMEs (Laukkanen et al., 2007). While ERP systems have been widely implemented in developed countries, ERP implementations in emerging economies are increasing but still lag far behind those of developed economies (Huang & Palvia, 2001). Developing countries have also shown high rates of ERP failure which has been partially attributed to poor fit between the information systems design and the organisational setting into which that system is being introduced (Hawari & Heeks, 2010). Therefore there is a pressing need to better understand ERP adoption factors particularly in developing countries and in SMMEs.

1.3 Previous related research

The way ERP systems are perceived, treated and integrated within a business plays a critical role in the successful adoption of the system (Srivastava & Gips, 2009). Top management commonly face unwanted attitudes from users, and should therefore proactively deal with these instead of reactively confronting them (Aladwani, 2001).

Aside from the cultural factors, other factors have been suggested as barriers to ERP implementation. Laukkanen et al. (2007) conducted a survey comparing the differences in constraints faced by small, medium and large organisations. Their findings showed that small organisations should place emphasis on user training and facilitation during implementation to ensure the successful adoption of the ERP system. Ramdani, Kawalek, and Lorenzo (2009) stated that the adoption of information systems innovation in SMMEs cannot be reduced merely to the issue of organisational size in comparison to large organisations. More research is therefore needed to elucidate SMME concerns.

1.4 Purpose of this research

This research aimed to identify ERP User Adoption constraints faced by SMMEs in an emerging economy. In this research, the objective is to develop a User Adoption framework that will be specifically useful to SMMEs, and which can be applied to different contexts in which ERP implementations take place.

1.5 Objectives of the research

This research has three main objectives. Firstly, to identify user adoption constraints faced by SMMEs during the adoption of an ERP system. Secondly, to develop a User Adoption model that would be useful to SMMEs during the adoption of an ERP system; and lastly to assist SMMEs during an ERP implementation.

1.6 Scope and Value

The focus of this research was to specifically investigate User Adoption constraints in SMMEs in emerging economies before and during an ERP implementation.

The major reasons why this research is important are as follows:

ERP vendors are now tailoring their packages to meet the needs of SMMEs. Information Technology (IT) is becoming less expensive, which makes ERP systems a reality to smaller organisations, and the adoption of this software needs to be effectively researched.

The outcome of this research is a model of categories and the relationships between them. The theory aims at supporting and enriching the existing body of knowledge on ERP implementations in emerging economies, more particularly for SMMEs in a South African context.

This research aims to contribute to the improved understanding of information systems implementations. A limited amount of research addresses end users' adoption of ERP systems (Legris, Ingham & Collerete, 2003). The researcher compared various implementation projects, but strategically decided to select two organisations (implementing the same software package) with less than 200 employees to conduct research.

1.7 Structure of this thesis

This thesis continues with Chapter 2 which details the literature review, including the identification of factors which influence ERP User Adoption both in developed and emerging economies. Chapter 3 presents the Research Methodology. Chapter 4 describes the first Action Research Cycle (ARC) and gives a detailed description of each of the ARC phases; Chapter 5 describes the second ARC and gives a detailed description of each of the ARC phases. Chapter 6 presents the data analysis of this research which includes findings of both ARCs and the data analysis which took place during each phase. Chapter 7 presents the detailed findings and the final research model; and Chapter 8 presents the conclusion and limitations of this research.

2. Literature Review

The aim of this chapter is to discuss the literature surrounding SMMEs and ERP user adoption studies both in developed and emerging economies. Section 2.1 provides an overview of the SMME terms used throughout this research. Section 2.2 discusses ERP products for SMMEs. Section 2.3 discusses ERP market segment for SMMEs. Section 2.4 gives an overview of the ERP market place for SMMEs. Section 2.5 gives a review of ERP user adoption studies which includes defining the subject area and the emerging economy context. Sections 2.6 to 2.8 provide a review of user adoption studies both in developed and emerging economies. Section 2.9 and 2.10 presents a summary of adoption studies conducted in emerging economies including relevant findings. The chapter ends with a conclusion in Section 2.11.

2.1 Small, medium and micro enterprises (SMME)

This section defines the terms that have been used throughout the section.

SME: Small and Medium-sized Enterprises within a South African context refer to organisations with fewer than 200 employees, a maximum turnover of R20 million and a total gross asset value which does not exceed R18 million (Republic of South Africa, 2003).

SMME: Small, Medium and Micro Enterprises

SMB: Small and Medium Business. SMMEs are termed **SMB** in North America

Table 1 below gives an overview of the different ERP vendor classifications.

Table 1: Tier examples (Ultra Consultants, 2011)

Tier:	Description	ERP Examples
Tier 1:	These are software for large organisations which are multi-site, multi-national corporations. The revenue of these companies exceeds \$1 billion and they are probably geographically dispersed and span multiple companies. These organisations have complex requirements and only a few vendors have functionality to meet these requirements.	SAP and Oracle.
Tier 2:	Tier 2 customers are single-site customers with revenue more than \$50 million but less than \$1 billion. These customers are often large organisations but their applications are less complex.	ABAS, CDA Software, Cincom, Epicor, Fujitsu, IBS, IFS, Infor, Microsoft Dynamics, Plex Systems, Pronto, QAD and Ramco.
Tier 3:	Tier 3 vendors offer applications for smaller organisations that range in annual revenue of less than \$50 million. These applications have limited complexity and are often designed for a vertical industry.	Consona, Exact Americas, Expandable, Global Shop Solutions, HarrisData, Netsuite, sage Software, Smarter Manager, Solarsoft Business Systems and Syspro.

ERP software suitable for SMMEs was the main focus of study during this research project. The term SMME is used throughout this research paper.

2.2 ERP market for SMMEs

Worldwide ERP Applications Licence, Maintenance and Subscription Revenue growth between 2008 and 2013 is predicted to be dominated by medium (5.5 percent) and small (5 percent)-sized businesses, with large businesses only showing revenue growths of 2.6 percent (Pang, 2004). According to ARC Advisory Group (2008), there are over 55 suppliers in the ERP SMME space, and this market will remain fragmented with various vendor opportunities available. Due to globalisation, mid-market ERP vendors are increasing their international presence. To successfully market ERP products, vendors must ensure that specific country versions are available for smaller countries. These vendors need to ensure that the correct localisation, legal and statutory requirements are met before their products are deployed to smaller countries (Hestermann et al., 2009). It is important for vendors to comply with individual country legislation and regulatory requirements to prevent them from facing financial penalty. Vendors need to familiarise themselves with local country specific operations and processes to implement them effectively (SAP, 2004). In the long term, it is predicted that vendors will adopt the right product development strategies, and target the correct regions and countries (ARC Advisory Group, 2008).

According to AMR Research (2007), emerging markets such as Brazil, Russia, India and China (BRIC) will be the major area of growth for future ERP markets. BRIC is the acronym for the world's largest emerging economies created by Goldman Sachs. South Africa has been asked to join this group of major emerging markets. BRIC will now be referred to as BRICS (Hutchinson & Crane, 2011). These growth rates will overtake North America, Western Europe and Russia. Other emerging economies such as the Middle East, Asia-Pacific and Latin America will continue to grow at a steady pace. Outside of the US and Western European markets, a majority of the companies would be considered small and medium-sized organisations.

While the South African SME sector is a large and growing one, its approach tends to be a very entrepreneurial one, and as such, its spend on new technology is usually related to how IT pertains to its core business (IBM, 2007). While organisations all hope to reap the benefits of ERP systems, they must first understand the impact that the implementation will have on their employees (Chang et al., 2008).

2.3 ERP market segment for SMMEs

The enterprise application software market declined by 6 percent during the 2009 recession. Businesses globally have implemented cost constraints and reduction strategies across customers and suppliers, and government data has predicted an increase in GDP, in 2010, for manufacturing and retail sales (AMR Research, 2007). Figure 1 depicts the trends in the ERP software market that is dependent on the speed of economic recovery during 2010.

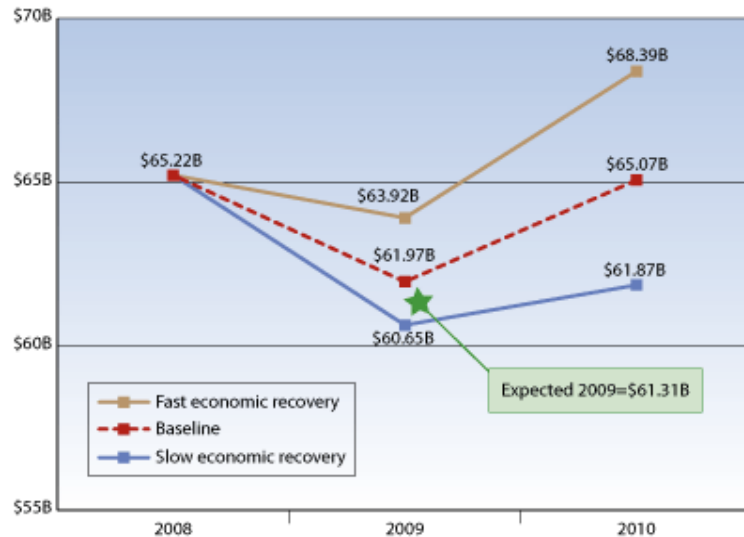


Figure 1: Traditional enterprise application market 2008 – 2010 (AMR Research, 2007)

Figure 2 gives a five-year market analysis and forecast for market growth in the Tier 3 space.

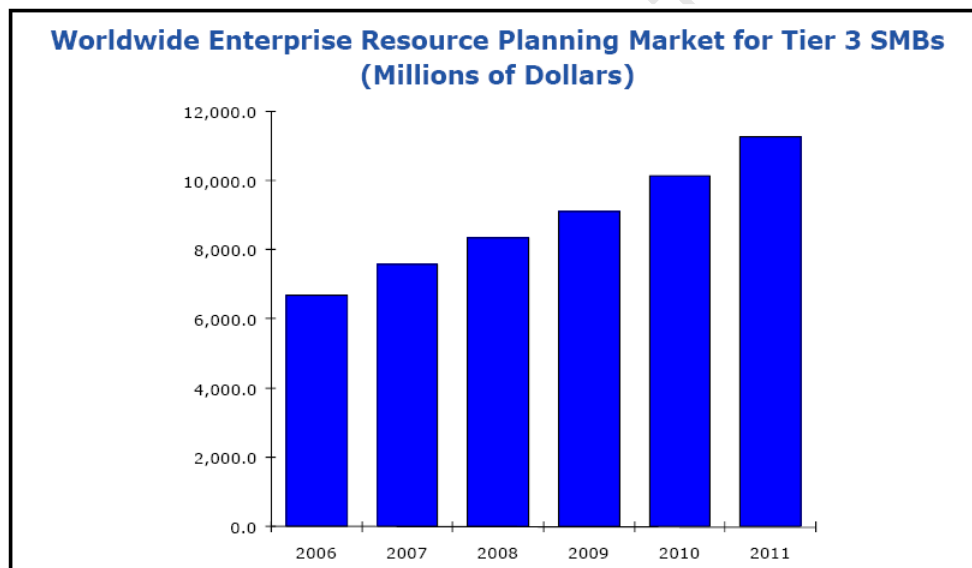


Figure 2: Five-year market analysis and forecast through 2011 (ARC Advisory Group, 2008)

According to ARC Advisory Group (2008), there were over 55 suppliers in the Tier 3 space and this space would remain fragmented; as a result there are various opportunities available in this area. In the long term, vendors are predicted to adopt the right product development strategies, and target the correct regions and countries (ARC Advisory Group, 2008).

2.4 ERP Market Place for SMMEs

Many would analyse small and medium ERP processes as less complex compared to large ERP systems. Gartner has produced research that analyses mid-market ERP as a unique process framework, and that medium-sized enterprises have a core set of business processes that are more complex than those of large enterprises (Hestermann et al., 2009).

Large ERP vendors are now developing lower cost solutions for smaller businesses. As a result there has been an increase in the number of products available to SMMEs and some products are much more proven than others. SMMEs should engage in a vendor selection process that ensures they choose the ERP package that meets the needs of their specific organisation (Kimberling, 2009). The mid-market ERP space is fragmented, but the vendors which focus specifically on specific industries are often narrowed to a small selection (Hestermann et al., 2009). Global vendors which dominate the SME market share include Sage (6 percent), SAP (28 percent), Oracle (14 percent), Infor (6 percent), Microsoft (4 percent) and other vendors (41 percent) (Hestermann et al., 2009). ERP vendors can be segmented into four quadrants. These quadrants are challengers, leaders, niche players and visionaries (Figure 3).

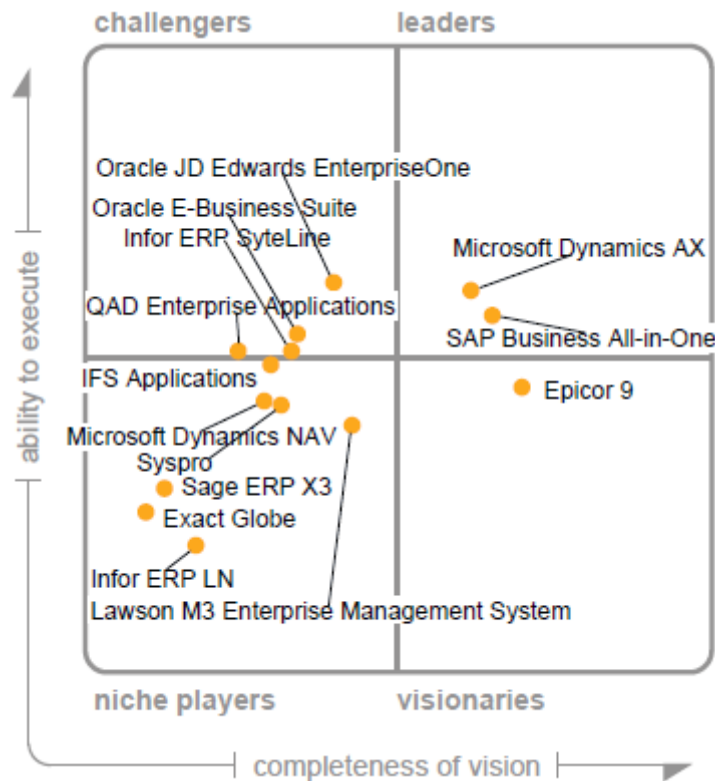


Figure 3: Mid-market and Tier 2-oriented ERP (Hestermann, Pang & Montgomery, 2010)

Of the top five vendors, Sage, Infor and Microsoft are focused on mid-market share; SAP and Oracle serve the mid-market with part of their ERP portfolios (Hestermann et al., 2009). The ERP solutions which dominate the mid-market space include Microsoft Dynamics AX, SAP Business All-in-One and Epicor Vantage (Figure 3). Figure 4 identifies the trends in the SME software market. During 2008, SAP Business All-in-One was the market leader in the SME space globally with 73,000 customers and they own 43 percent of the ERP market (Brandt, 2010).

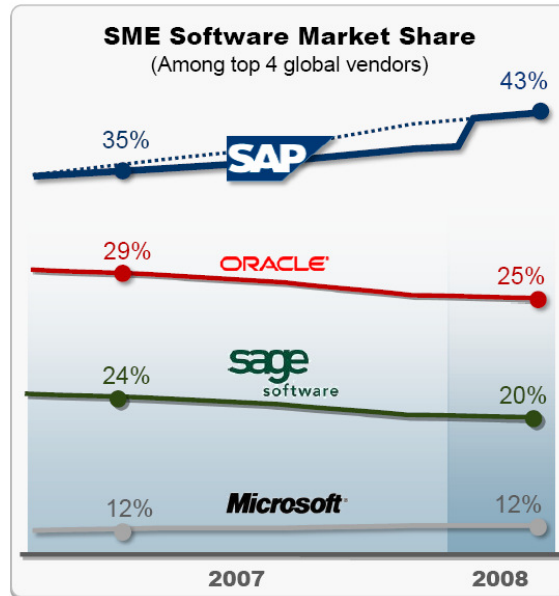


Figure 4: Leading vendors in the SME market (Parker, 2009)

A detailed overview of these products is presented in Appendix B.

2.4.1 ERP Market Place in South Africa

The SMME market place in South Africa offers a wide range of opportunities for vendors. Technology developments which include better connectivity and cloud computing will improve the adoption of ERP solutions in South Africa. A new trend in the market revealed that “software as a service” (SaaS) is a viable option for SMMEs because it saves cost. Although this is an upcoming solution, many business owners are not familiar with SaaS and its benefits; and organisations also prefer to make tangible investments (Red Ribbon Communications, 2011). Hence, SMMEs in South Africa prefer to use traditional tools to stay competitive, without realising the power of ICT and ERP solutions to help them take on competition - small big or global (Modimogale & Kroeze, 2011).

Currently the maintenance cost of an ERP system is very high for SMMEs in South Africa and they often cannot afford these costs in the long run. Vendors will need to find innovative ways to meet service level agreements and customer expectations (Red Ribbon Communications, 2011). SMMEs in the South African market place face numerous difficulties to successfully implement new ERP packages. ERP vendors often have all the skills to customise all the new software, but have difficulties in integrating the new software packages with the legacy systems that companies rely on. As a result, many organisations are sceptical to implement new solutions (ITweb, 2011).

The biggest problem SMMEs face in achieving the full value of their investment does not have to do with the capabilities of the technology itself, but the limitation lies with the people using the technology to understand and take advantage of what the system has to offer (SME South Africa, 2011). Improved bandwidth in South Africa is opening up opportunities for organisations to have access to ERP solutions which were previously not possible. The speed of implementations is improving and as a result the challenges move from the ERP systems to the personnel and

processes in the organisations and the ability to successfully adopt the new ERP system (Red Ribbon Communications, 2011).

2.5 ERP User Adoption studies for SMMEs

This section presents a literature review of recent ERP adoption studies. These studies include implementations in large organisations and SMMEs in both developed and emerging economies. Section 2.5.1 outlines the subject of this research.

2.5.1 Defining the subject area

ERP systems have been widely implemented in developed countries. Subsequently while ERP and User Adoption in large organisations in developed countries has been widely researched, the adoption of IT in SMMEs is unique and understudied and even less research has been conducted in emerging economies (Anderson & Schwager, 2004). Hence the focus of this research is on ERP implementation in SMMEs within an emerging economy context.

2.5.2 The SMME and emerging economy context

ERP implementations in SMMEs come with their own challenges. In many organisations the implementation of an ERP system is the single biggest IT project that will take place in an organisation and as a result, this change poses many challenges (Moon, 2007). Due to resource poverty, the adoption of ERP systems holds a greater risk to SMMEs (Laukkanen et al., 2007).

ERP Adoption studies done on SMMEs have mainly focused on factors such as operational support, managerial productivity and strategic planning. However, not many studies focus specifically on User Adoption. Thus the adoption of information systems in SMMEs in comparison to large organisations cannot simply be reduced to the issue of organisational size (Ramdani, Kawalek & Lorenzo, 2009). Small organisations need to place sufficient emphasis on user training and facilitation during implementation to ensure the successful adoption of the ERP system (Laukkanen et al., 2007). More research is needed to elucidate SMME concerns.

2.5.3 The focus on users and adoption

The way ERP systems are perceived, treated and integrated within a business plays a critical role in the successful adoption of the system (Srivastava & Gips, 2009). Research has shown that social factors determine the successful usage of an ERP system (Beaudry & Pinsonneault, 2005) and that top management commonly face an unwanted attitude from users (Aladwani, 2001).

Various forms of research have attempted to study the adoption of ERP systems from the organisational, technical and user perspectives. There are two main streams of research on IT adoption: research which focuses on technology acceptance at an individual level and research which focuses on implementation at an organisational level (Venkatesh & Davis, 2000). The following are explanations of the terms - Adoption, Organisational Adoption and User Adoption:

Adoption: Adoption can be regarded as “a mechanism for acquainting us with changes in the environment” (Ullsperger & Gille, 1988, pp. 299-300). Adoption of ERP systems is therefore a means of acquainting users with the new ERP system.

Organisational Adoption: The term organisational adoption consists of three factors – “The capability of the organisation, the innovativeness of the organisation and the gap between the organisation and the ERP system” (Basoglu, Daim & Kerimoglu, 2007, p. 90). ERP projects are different from other software projects because they require business process changes in organisations (Mandal & Gunasekaran, 2003).

User Adoption: User Adoption is “an important factor affecting organisational adoption of an ERP system. Here, the term user consists of the capability of the user, the innovativeness of the user, support activities given to user and the gaps of user with organisation and technology” (Basoglu et al., 2007, p. 91).

The emerging economy context can also present problems. When a Western-developed ERP system is implemented in an emerging economy, where the culture differs from that of the ERP country of origin, the implementation may require substantial localisation to be successful (Srivastava & Gips, 2009). Wang, Klein and Jiang (2006) refer to potential misfits at a country, organisational and individual level, highlighting the problems with implementing ERP systems originating from a different country.

It seems that user concerns dominate in emerging economies. User Adoption constraints identified during an ERP implementation in Jordan include dissatisfaction regarding lack of involvement during the implementation process, inaccurate data available on the new system and low levels of use, post-implementation (Hawari & Heeks, 2010). Emphasising the user perspective, a study in Southern Poland identified that User Adoption issues are the number one cause of implementation failure (Soja & Paliwoda-Pekosz, 2009). Problems described include fear, anxiety and lack of acceptance from employees. Knowledge and training problems were identified as the main cause of the majority of difficulties. More critically, Al-Mashari and Zairi (2000) identified key factors that led to a failed ERP implementation in a major Middle Eastern manufacturing company. Results indicate that a main cause of failure relates to early user resistance during the design of the implementation which increased anxiety during the implementation process. Management failed to take action to support user concerns and a lack of communication increased user resistance after the implementation process.

2.6 User Adoption studies in large organisations in developed economies

While many ERP technology acceptance models have been proposed, not many models have looked at dealing with user resistance. There are various types of user resistance when implementing an ERP system. To overcome user resistance, change management strategies need to be applied. Aladwani (2001) presented a process framework to assist in managing change associated with ERP systems. This framework shown in Figure 5 consists of three phases: knowledge formulation, strategy implementation and status evaluation.

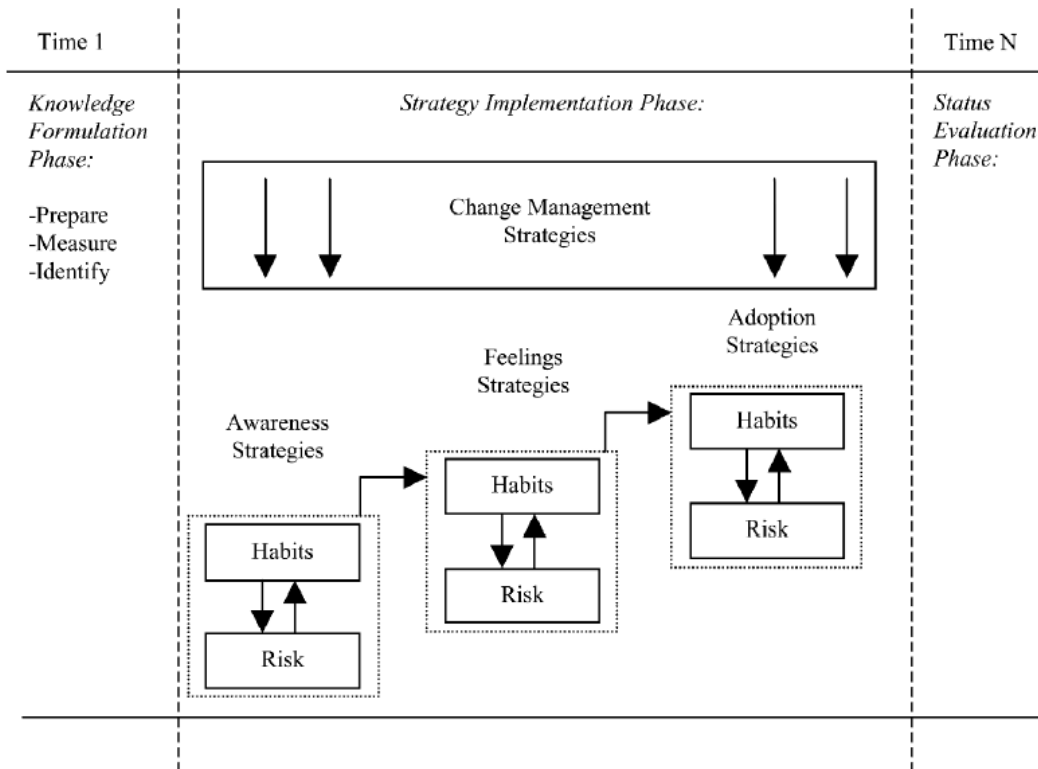


Figure 5: A suggested framework for managing change associated with ERP (Aladwani, 2001)

During the knowledge formulation phase, the individual users and influential groups need to be understood; subsequently, during the strategy implementation phase, top management can use the information gathered during the knowledge formulation phase. Management strategies can be planned to overcome users' resistance to change and to provide support to ensure effective adoption of the ERP implementation. The strategies might include communication, training, informing the users of the benefits or a general description and how the implementation process will work (Aladwani, 2001).

The status evaluation phase includes the process of monitoring and evaluating the change management strategies for the ERP implementation. During this phase, top management must ensure that users' resistance to the ERP implementation has been overcome. The outcome during this phase may be positive or negative. The feedback received during this phase is important for future decision making.

While this model is useful for implementers it does not add understanding of the factors behind user resistance or adoption. The applicability of this model in a developing country or SMME also needs to be established.

2.7 User Adoption studies in SMMEs in developed economies

SMMEs differ from large organisations in that they often lack the large amount of resources and skills required for an ERP implementation (Laukkanen et al., 2007). This section identifies relevant User Adoption models and factors that need to be considered before and after an ERP implementation. These studies were conducted in SMMEs in developed economies.

2.7.1 Adoption as perceived by top management

Davis (1989) proposed a technology acceptance model (TAM) which is a framework that contributes towards understanding factors which may influence a user's acceptance or rejection of technology. TAM has two underlying constructs: perceived usefulness and perceived ease of use. Perceived usefulness describes the degree to which a user will see a system as beneficial to his/her job performance. Perceived ease of use describes the degree to which the person believes that the system would be effortless to use. Grandon and Pearson (2004) used the TAM model to study the adoption of electronic commerce as perceived by top managers in SMMEs. The study attempted to build a framework presented in Figure 6, which explains how the perceived strategic value of e-commerce influences managers' attitudes toward e-commerce.

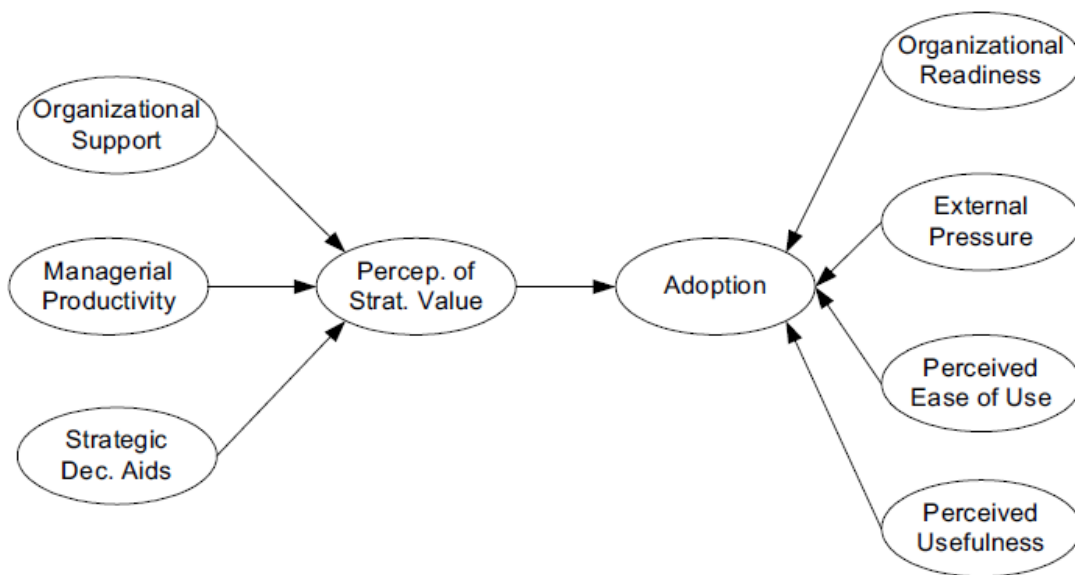


Figure 6: E-commerce adoption as perceived by top managers (Grandon & Pearson, 2004)

The results of the study revealed that a significant relationship exists between the perceived strategic values and adoption by SMMEs. Strategic value variables include organisational support, managerial productivity and strategic decision aids. Other factors influencing e-commerce adoption include organisational readiness, external pressure, perceived ease of use, and perceived usefulness (Grandon & Pearson, 2004). This model, while useful, can not necessarily be generalised to ERPs and ERP users. Also, TAM models such as this have faced many criticisms. In many cases, TAM has been used to study User Adoption of email and word processors which are easy to use (Nah, Tan & Ten, 2004). Researchers have emphasised the need to extend or revise TAM to explain User Adoption of complex IT systems such as ERP in organisational settings (Legris, 2003). TAM has also been restricted to studies where the adoption and use of the technology is voluntary, and not mandatory as is the case with ERP systems (Brown et al., 2002; Legris et al., 2003).

2.7.2 The Unified Theory of Acceptance and Use of Technology

Venkatesh et al. (2003) introduced the United Theory of Acceptance and Use of Technology (UTAUT) model which can be used to increase the understanding of the acceptance and adoption

of Information Systems of individual users and has been used to study mandatory systems. Although UTAUT was originally designed to study User Adoption in large organisations, Anderson and Schwagner (2004) used the UTAUT model in the context of a small organisation to determine the adoption of Wireless Local Area Network (WLAN) technology by SMMEs.

The UTAUT model shown in Figure 7 comprises four constructs which include performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the degree to which a user believes a system will help him/her to increase his/her job performance. Effort expectancy relates to the degree of ease associated with the use of an Information System. Social influence is the degree to which a user believes that superiors believe it is important to use a system and facilitating conditions is the degree to which an individual believes an organisation can provide the necessary support to help him/her use the system (Venkatesh et al., 2003). The moderating variables are gender, age, experience and voluntariness of use which impact the technology acceptance by an individual. Once again, this model cannot merely be generalised from organisational adoption of a WLAN to mandatory User Adoption of an ERP.

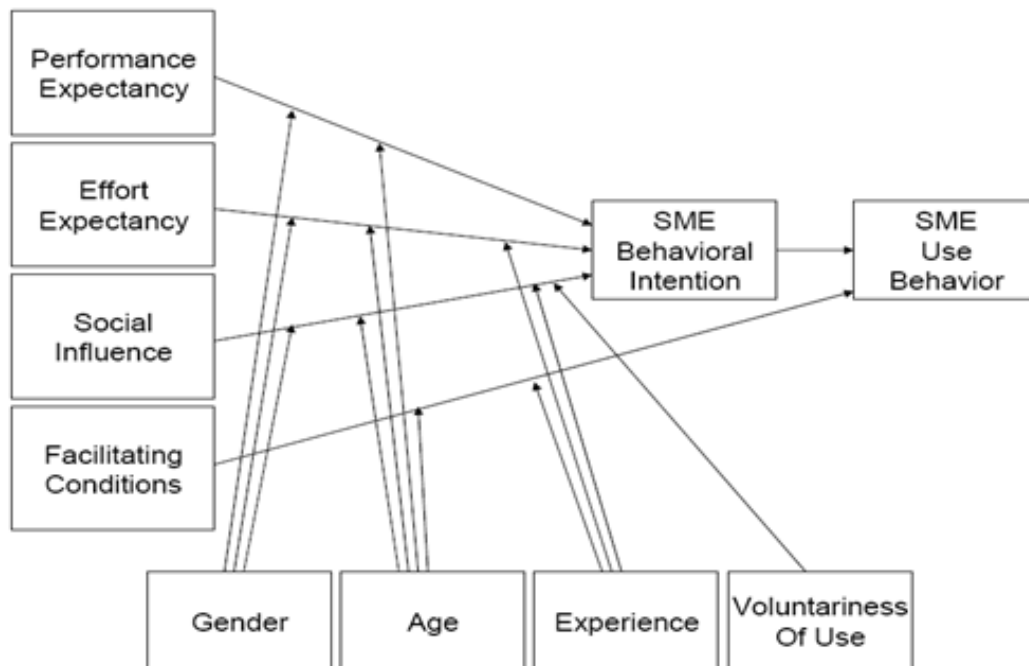


Figure 7: Unified Theory of Acceptance and Use of Technology (Anderson & Schwagner, 2004)

2.7.3 Factors influencing ERP outcomes

Federici (2009) introduced a framework presented in Figure 8 which aims to evaluate ERP implementations in SMMEs. This framework intends to identify associations between the context and the project factors which have an effect on the ERP project outcome. The context factors include the size (for example micro, small or medium organisation) of the SMME and the economic sector in which the SMME operates. The project factors that influence an ERP implementation include the extent of organisational change, number of updated processes and the software vendor. The five potential benefits of a successful ERP implementation include cost

reduction, improved performance management, easier information retrieval, procedure simplification and efficiency improvement. The benefits can be divided up into categories which include economic results, management control, and operating efficiency. This framework can also be used to determine the strength between the associations and which decisive factors need to be managed in order to improve the project outcome. This model (Figure 8), while valuable in showing the factors leading to positive ERP outcomes, does not look at User Adoption factors.

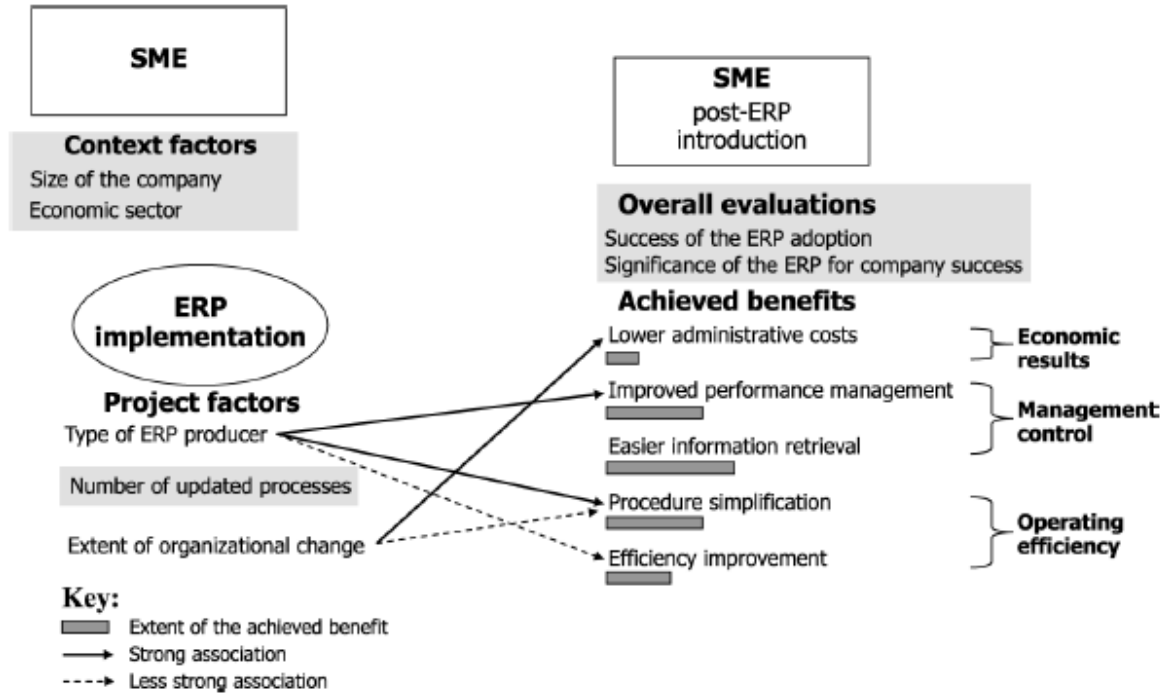


Figure 8: Factors influencing ERP implementation outcomes (Federici, 2009)

2.7.4 Summary of ERP adoption studies in developed economies

Relevant ERP adoption models have been presented and evaluated. Table 2 presents a summary of these models and is supplemented with a critique of further studies which show valuable findings.

Table 2: Summary of Adoption studies in developed economies

Author(s)	Organisation size and country	Findings
Lim, Pan, & Tan, 2005	Large enterprise – United States	Users and management do not share the same view of an ERP implementation. Because of the hierarchy in an organisation, management and users do not agree on the usefulness of a system. ERP system usage is linked to the fulfilment of users' expectations.
Poba-Nzaou, Raymond, & Fabi, 2008	Small and medium enterprise - France	Strategies to increase "user participation" were identified as key from the adoption stage onwards and decreased organisational risk. Talking to end users and understanding their expectation, the organisation minimised user dissatisfaction and poor system quality.
Tagliavini, Faverio, Ravarini, Pigni & Buonanno, 2005	Small and medium enterprise - Italy	SMEs perceive an ERP solution as a way to integrate their internal business processes and not necessarily to integrate with external partners. Findings identify that management issues in complex organisations will decrease once an ERP system is implemented within the organisation.
Ramdani & Kawalek, 2009	Small and medium enterprise - England	This study used the technology-organisational-environment (TOE) model to predict the adoption of enterprise systems. Findings indicate that SMEs are more vulnerable to technological and organisational factors and less vulnerable to environmental factors than compared to large organisations.
Kurupparachch, Mandal, & Smith, 2002	All sizes – United States	This research presented a conceptual change management model incorporating project management and change management techniques.
Mandal & Gunasekaran, 2003	Large enterprise - United States	This research identified strategies for pre-implementation, implementation and post implementation of ERP systems.
Laukkanen et al., 2007	All sizes – Finland	This research identified the differences in ERP adoption between small, medium and large organisations. Findings indicate that small organisations lack knowledge resources and they should invest in external experts and consultants. Training of users should receive more attention when compared to larger organisations. Medium-sized organisations are more outwardly focused and their main aim includes business development whereas small organisations focus on integration when adopting an ERP system. Small and medium-sized organisations should not be viewed as one homogenous group.
Ignatiadis & Nandhakumar, 2006	All sizes – England	Findings emphasise that the measure of control given to users should be managed effectively. Increased attention should be paid to authority levels given to users of the system. Too much control will streamline operations but will make the organisation less flexible. Too little control will cause potentially harmful drift in the organisation.

2.8 User Adoption studies in large organisations in emerging economies

This section reviews studies and user models which have been researched in large organisations in emerging economies. User concerns dominate in emerging economies and hence models to understand these User Adoption concerns have been developed.

2.8.1 Symbolic adoption as a determinant of ERP adoption

While TAM does not cater for mandatory use of a system, the UTAUT model includes voluntariness of use. Yet, the model has been criticised as the dependant variable, behavioural intention, appears to not cater for mandatory usage. Hence, more recent studies such as Seymour et al. (2007) introduced symbolic adoption as a measure of user acceptance in a mandatory context (Figure 9). Once again this quantitative study can be criticised in that factors from the literature were merely validated and no new factors were sought.

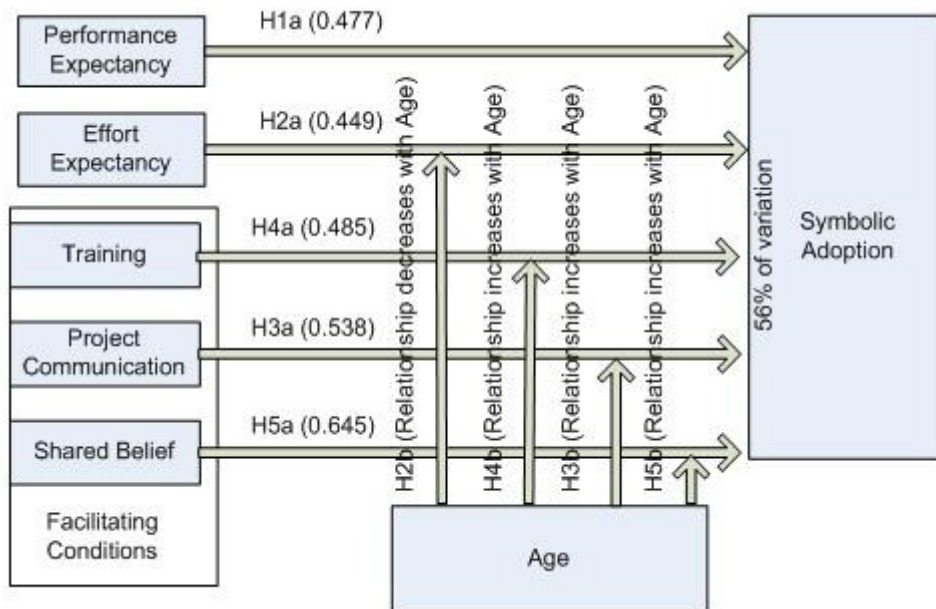


Figure 9: Symbolic adoption as part of ERP usage (Seymour, Makanya & Berrangé, 2007)

2.8.2 User Adoption framework

The User Adoption framework shown in Figure 10 comprises various elements which need to be addressed during an ERP implementation. These elements include implementation actions, affective response, system perceptions, job impact, and facilitating conditions. Implementation actions include actions that need to be considered for a system to be successfully introduced to a user. Top management should consider strategies and techniques to gradually introduce a new system to users.

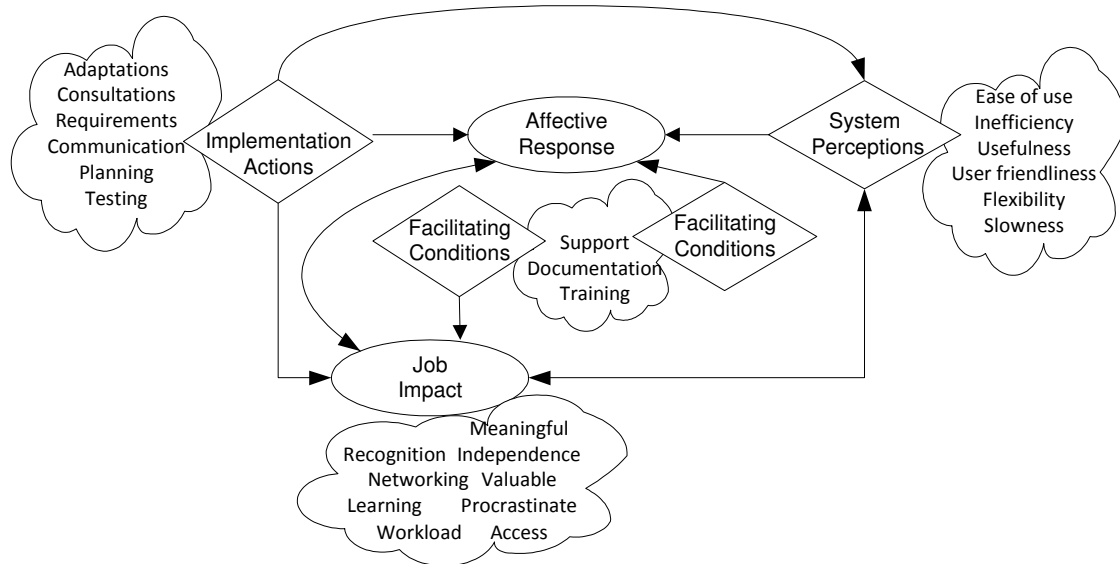


Figure 10: User Adoption framework (Seymour & Roode, 2008)

It is important to evaluate the affective response of users towards an ERP system implementation. This is because the negative attitude users have toward an ERP implementation can affect a whole group of users and can result in the unsuccessful adoption of an ERP system (Seymour & Roode, 2008). Users' system perceptions also need to be considered to ensure successful ERP implementation. Lack of training, documentation and user support can result in a user perceiving the system to be a burden and not as a strategic tool (Kennerley & Neely, 2001).

Some users may view an ERP implementation as an opportunity to learn and enhance their skills. In contrast, other users will view the implementation as a burden that will result in no benefits. The impact of an ERP implementation on a job is a personalised response (Seymour & Roode, 2008). Facilitating conditions include user documentation, support and training and these need to be available to support users before and during an ERP implementation and can influence affective response and job impact (Seymour & Roode, 2008). While this model seems the most valuable in understanding User Adoption, it cannot necessarily be generalised to SMMEs where resource constraints potentially limit implementation actions and the relevant facilitating conditions might be substantially different.

2.9 Summary of Adoption studies in emerging economies

Table 3 presents a summary of adoption studies conducted in emerging economies including relevant findings.

Table 3: Adoption studies conducted in emerging economies

Author(s)	System, Organisation size & Country	Findings
Seymour et al., 2007	ERP, Large enterprise – South Africa	ERPs fail to achieve their benefits because end-users do not accept the system. This model introduced symbolic adoption as a measure of user acceptance in a mandatory context (Figure 7).
Seymour & Roode, 2008	ERP, Large enterprise – South Africa	A User Adoption framework was presented which comprises of five elements. These elements include implementation actions, affective response, system perceptions, job impact, and facilitating conditions.
Srivastava & Gips, 2009	ERP, Not specified – China	An ERP system's strategic value is restricted due to cultural barriers.
Huang & Palvia, 2001	ERP, Not specified – (Brazil, China & India)	This research compared ERP implementations between developed and developing countries. This research also identified a developing economy framework which included economic, cultural and basic infrastructure issues as barriers to adoption.
Matthews, 2007	Any IT system, Small and medium enterprise – Global (46 Countries).	SME growth is limited in developing countries due to lack of infrastructure and connectivity. Governments globally need to continue to provide an environment for growth; and the need for ICT will then grow automatically.
Cloete, Courtney, & Fintz, 2002	e-Commerce, Small and medium enterprise – South Africa	Factors which affect e-commerce adoption include the characteristics of the organisation and the context in which the organisation finds itself.
Yusuf, Gunasekaran, & Wu, 2006	ERP, Not specified – China	Difficulty in ERP adoption is related to the organisational ownership and the size of the organisation. Solutions to overcome these challenges include ERP software selection and ERP implementation team, Business Process Re-engineering (BPR), training, and outsourcing application service provider.
Soh, Sia, Boh, & Tang, 2003	ERP, Large enterprise – Singapore	Fundamental incompatibilities exist between the embedded structure of ERP system and the implementing organisation. This includes tensions between forces of integration and differentiation, process-orientation and functional specialization, flexibility and restrictiveness and packaged versus organisational domain specificity.
Noudoostbeni, Yasin, & Jenatabadi, 2009	ERP, Small and medium enterprise – Malaysia	From a user perspective, findings indicate that poor planning and management is the main cause of ERP failure.

2.10 A Summary of User Adoption factors relevant to emerging economies

This research has shown that a clear gap exists concerning ERP research in emerging economies as well as in SMME organisations. Table 4 summarises the User Adoption factor identified in the literature.

Table 4: Factors affecting User Adoption

Category	Factors	References	
Facilitating Conditions	Training	Anderson & Schwagner, 2004; Al-Mashari & Zairi, 2000; Chang et al., 2008; Hawari & Heeks, 2010; Kennerley & Neely 2001.; Laukkanen et al., 2007; Seymour, Makanya & Berrangé, 2007; Seymour & Roode, 2008; Soja & Paliwoda-Pekosz, 2009; Venkatesh et al., 2003.	
	Support		
	Documentation		
	BPR		Yusuf, Gunasekaran & Wu, 2006
	Project Communication		Aladwani, 2001; Al-Mashari & Zairi, 2000; Gargeya & Brady, 2005. ; Laukkanen et al., 2007; Seymour, Makanya, & Berrangé, 2007.
	Shared Belief	Seymour & Roode, 2008	
	Top management support	Aladwani, 2001; Al-Mashari & Zairi, 2000; Gargeya & Brady, 2005; Seymour & Roode, 2008.	
Implementation Actions	Consultation Requirements User Communication Planning Testing End User Involvement	Al-Mashari & Zairi, 2000; Chang et al., 2008; Hawari & Heeks, 2010; Seymour & Roode, 2008.	
System Perceptions	Ease of Use Performance expectancy Effort expectancy	Aladwani, 2001; Chang et al. 2008; Grandon & Pearson, 2004; Hawari & Heeks, 2010; Kennerley & Neely, 2001; Seymour, Makanya, & Berrangé, 2007; Seymour & Roode, 2008.	
	Performance – outcome instrumentality Outcome valence Instrumentality		Lim et al., 2005
External Constraints	Organisational culture, country culture	Srivastava & Gips, 2009; Huang & Palvia, 2001;	
Affective Response	Affect Near-term consequences Long-term consequences	Chang et al., 2008; Seymour & Roode, 2008.	
Job Impact	Meaningful Independence Valuable Procrastination Access Learning Efficiency improvement Procedure management Levels of use Computer literacy levels	Aladwani, 2001; Anderson & Schwagner, 2004; Federici, 2009; Hawari & Heeks, 2010 Hong & Kim, 2001; Seymour & Roode, 2008; Soja & Paliwoda-Pekosz, 2009.	

2.11 Conclusion

The models reviewed in this literature review identify a large amount of user adoption constraints which has been faced both in developed and emerging economies. These constraints identified have been categorised as Facilitating Conditions, Implementation Actions, System Perceptions, External Constraints, Affective Response and Job Impact. It is clear that most of the literature highlighted Facilitating Conditions, Implementation Actions and Job Impact, but a limited amount identified External Constraints such as Organisational and Country Culture. This research attempted to identify which of these factors are relevant to SMMEs in emerging economies.

The User Adoption framework (Seymour & Roode, 2008) which comprises of five categories was used as a guideline throughout this study, including multiple readings from literature. This study seemed appropriate since it focused on user adoption constraints. The context of the study by Seymour and Roode (2008) was focussed on a large organisation in an emerging economy, and served to enhance the theoretical sensitivity of the researcher. While this model was valuable in understanding User Adoption, it needed to be modified and refined for SMMEs. The next section presents the research methodology of this research.

University of Cape Town

3. Research Methodology

This chapter gives an overview of the research strategy that was followed during this research. The underlying philosophy, research purpose and approach, research method, research questions, research framework, data collection strategy and analysis, validation criteria applied to research, timeline, confidentiality and ethics, expected difficulties and limitations, and the summary of the chapter are described.

3.1 Underlying philosophy

Research epistemologies can be divided up into three categories: positivism, critical and interpretivism (Orlikowski & Baroudi, 1991). During qualitative research it is necessary to identify the underlying assumptions associated with the chosen research approach. These assumptions are guided by the epistemology of the research (Myers, 2007).

Positivist research assumes that people share the same meaning of the world. Positivist research has the underlying assumption that fixed relationships exist and that the phenomenon is usually studied using a structured instrument (Orlikowski & Baroudi, 1991). Critics of positivist research state that it is superficial, fails to deal with how people think and feel, and that statistical samples often do not represent specific social groups (Cavana, Delahaye, & Sekaran, 2001).

Critical research is based on the assumption that reality is socially constructed. The aim of critical research is to identify and bring about awareness and understanding of the different forms of social dominance in society (Orlikowski & Baroudi, 1991). Critical research has been criticised that it forces change on people, often when these changes are not ready to take place. Other criticisms are that critical research is focused on destroying current reality without providing processes for building new reality (Cavana et al., 2001).

The interpretivist research approach assumes that people all view the world in a unique way. An interpretive study assumes that people often see how participants of the research perceive it to be (Cavana et al., 2001). An interpretive researcher thus aims to study a phenomenon through trying to understand the meaning people assign to the situation. Interpretivism believes that realities comprise social products and cannot be understood without the social actors (Orlikowski & Baroudi, 1991). Interpretive research was chosen as the appropriate method for this research since human complexities were studied so as to try and understand how they think, react and feel during an ERP implementation.

3.2 Research Purpose

The purpose of this research was both exploratory and explanatory. An exploratory study is useful when little information is available about the phenomenon being studied (Cavana et al., 2001). This study was exploratory since this research aims to explore and understand the User Adoption constraints faced during an ERP implementation in SMMEs. The area of User Adoption has been well researched, but the context in which this research took place is unique. A limited amount of research has been done on SMMEs in emerging economies, focused on User Adoption during an ERP implementation. Secondly this research was explanatory as the changes made during this

research were explored and evaluated. The following section gives a brief overview of the research approach that was taken during this study.

3.3 Research approach

The two main research approaches in Information Systems are qualitative and quantitative research. Quantitative research was developed to study natural phenomena and is mainly associated with surveys, laboratory experiments, formal and numerical methods (Myers, 2007). Quantitative research is based on the ideals of positivism and has been used for more than two hundred years. The aim of quantitative research is to gather exact and precise quantitative data that can be verified and compared (Cavana et al., 2001).

When doing qualitative research it is assumed that humans are unique and that their behaviour cannot be predicted. This research approach is focused more on social sciences and is aimed at understating participants' experiences and how they view the world they live in (Cavana et al., 2001). Qualitative research methods and analytic procedures are used for problem solving of inquiry in all social science disciplines (Borman, LeCompte, & Goetz, 1986). The motivation for doing qualitative research as opposed to quantitative research comes from the fact that the desire to understand participants in a particular social and institutional context is not possible when textual data is quantified (Myers, 2007).

The following section gives a brief overview of this research method and describes Canonical Action Research (CAR), the specific Action Research (AR) form that was used during this research.

3.4 Research method

This research applied multiple research methods. The two methods include AR and Case Study research strategy. Section 3.4.1 gives an overview of AR, and section 3.4.2 gives an overview of the Case Study research.

3.4.1 Action Research

There has been an increased call to make Information Systems research more practical and relevant (Benbasat & Zmud, 1999). In most research, researchers aim to study a phenomenon but do not intend to make any changes as part of the research process. AR is one way to improve the practical relevance of Information Systems research (Baskerville & Myers, 2004). AR aims to create organisational change and to study the process of creating this change (Kock, 2007, p.80). AR was applied to research User Adoption constraints during an ERP implementation. Once constraints were identified, actions were taken to assist the SMMEs to overcome these user constraints. These actions included assisting with the prototype of the ERP system, developing User documentation, and putting together User diagrams and training users on the ERP package.

AR was first used in the medical and social sciences in the 1920s but was later introduced to the field of Information Systems in the 1990s (Baskerville, 1999). AR is a research approach where the researcher collaborates with an organisation to try and solve problems faced within the organisational context. During this time, researchers have the opportunity to refine theoretical

models and produce theoretical knowledge (Kock, 2007, p. 64). Researcher applied AR as the predominant method. This research method allowed the researcher to be actively involved during the ERP implementation and to assist users during the implementation.

AR is a very important qualitative method in the field of Information Systems. This method is useful in studying complex, multivariate and real-world phenomena (Baskerville & Pries-Heje, 1999). AR is a useful research method in situations where participation and organisational change processes are necessary (Baskerville & Wood-Harper, 1996). This method is well suited to study the adoption of ERP systems in SMMEs. The impact of the ERP implementation was disruptive to the SMMEs, and action was taken by the researcher to assist users during the implementation process. These actions were guided by various theoretical models which include the following - User Adoption Model (Seymour & Roode, 2008); Understanding ERP system adoption (Chang et al., 2008); Factors influencing ERP implementation outcomes (Federici, 2009) and UTAUT model (Anderson & Schwagner, 2004). During the research, the changes made and the impact of these changes were studied.

There are various forms of AR each with a different set of goals and characteristics. The following ten forms of AR have been identified: Canonical Action Research (CAR), Information Systems Prototyping, Soft Systems, Action Science, Participant Observation, Action Learning, Multiview, Ethics, Clinical Fieldwork and Process Consultation. Each form can be characterised by the process model, structure and involvement by the researcher. Baskerville and Wood-Harper (1996) note that AR can be characterised by firstly, a multivariate social setting; secondly, its highly interpretive assumptions about observation; thirdly, intervention by the researcher; fourthly, participatory observation; and lastly, the study of change in the social setting. The AR form that was chosen for this research was CAR. CAR is an iterative, rigorous and collaborative process and focuses both on organisational development and the generation of knowledge; the combination of these characteristics makes CAR unique among all forms of AR (Davison, Martinsons, & Kock, 2004). CAR was selected as the appropriate research method because it allowed the researcher to make changes as part of the research process and study the effects of these changes on the users.

Figure 11 depicts the five stages of the CAR process. These stages include diagnosing, action-planning, action-taking, evaluating and specifying learning stage. The five stages of the CAR process are centred on the Client-System Infrastructure. The Client-System Infrastructure is the context and research environment where the research should take place (Baskerville & Wood-Harper, 1998). It is important for all stakeholders to take part during this process to ensure thorough co-operation and collaboration during the Action Research Cycle (ARC).

Davison et al. (2004) have identified a set of principles to guide the Research Client Agreement (RCA). Firstly, the researcher and client need to agree that RCA should be the appropriate method for the organisational situation; secondly, the main aim of the research needs to be clearly and explicitly explained; and thirdly, the client must make an explicit commitment to the project. The fourth principle is that roles need to be clearly defined; the fifth principle stipulates that the objectives and the evaluation measures need to be defined; and lastly, the data collection

and analysis methods need to be identified. The RCA provides a foundation for CAR and these principles add rigour and relevance to the research. Once the RCA agreement has been established the researcher can start with the first stage of the ARC which is the diagnosing phase.

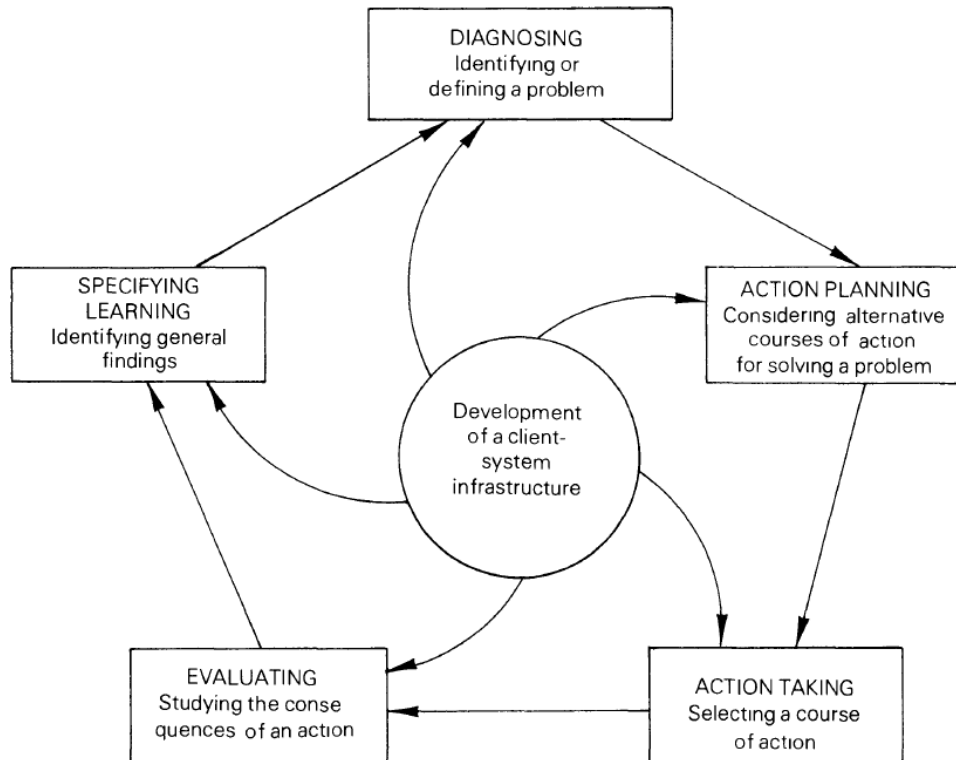


Figure 11: Canonical AR cycle (Susman & Evered, 1978)

The diagnosing phase is where the problems related to User Adoption in the organisation and reason for change should be identified. The researcher should interpret the complex social problem and the main reasons for change should be identified (Baskerville, 1999). During this stage, the client may identify some problems but the researcher should conduct an independent study to identify the main problem areas, related to the area of study.

The problems and the causes of these problems should be analysed and identified. During the diagnosing phase, a clear understanding of the environment and the context needs to be established. This information is necessary to plan for changes which should be implemented during the action-taking phase (Davison et al., 2004). During this phase, certain theoretical assumptions should be made about the organisation and its problems

The action-planning phase should take place once a clear understanding of the problems and issues in the research setting has been identified. During this phase of the CAR, the researchers and the practitioner should work together to determine which changes need to take place. The actions should be guided by a theoretical framework which identifies the ideal state for the organisation (Baskerville, 1999). This phase should indicate the desired state and the changes that need to be made to reach these targets (Baskerville & Wood-Harper, 1998).

During the action-taking phase, the action plan should be implemented (Baskerville, 1999). The researcher and the practitioner should collaborate during this stage to determine how the

intervention of the plan should be implemented. The planned actions should be guided by the underlying theoretical framework. This plan should consider the desired future state and the changes that need to be made to reach this ideal state (Baskerville & Wood-Harper, 1998).

After the action-taking phase, the researcher and the practitioner should collaborate to evaluate the results of the intervention. During the evaluation phase, irrespective of whether or not the changes were successful, a framework should be identified for the next iteration of the ARC (Baskerville, 1999). It is important to determine if the problems were solved and whether the changes made were successful.

During the final stage of CAR, it is important to determine whether the changes implemented were successful. It is important to determine which of the changes have been successful and which have not been. If the changes implemented were unsuccessful, a framework should be established that can be used during the next iteration of the ARC. During this stage, the theoretical framework used should be evaluated and this should provide a contribution to the academic community (Baskerville, 1999).

In many organisations, the implementation of a new information system is the single biggest change process that should take place. The core principle of CAR is to understand and address an organisational problem in the organisation. Using CAR, the User Adoption problems faced during an ERP implementation were identified and solved. The necessary changes focused on improving the User Adoption of ERP systems within the SMMEs.

3.4.2 Case Study Research

Information Systems research has distinct theoretical research perspectives and different methods to study each of these perspectives (Kaplan & Duchon, 1988). The aim of this research is to study User Adoption constraints during an ERP implementation. A qualitative case study research method was selected as the appropriate research strategy for this study.

Benbasat, Goldstein, and Mead (1987) identified the following as reasons why case study research is an appropriate qualitative approach for Information Systems research. Firstly, case study research gives a researcher the opportunity to study change in an organisation and to develop or refine theories from practice. Secondly, the research strategy allows a researcher to study "how" and "why" questions, and lastly, it is appropriate to use case study research where little information is known about the research area.

Using a case study approach has various aims. These include providing a description, generating a theory or to test a theory (Eisenhardt, 1989). The data collection methods during case study research include documents, interviews, direct observations and participant observations (Walsham, 1995). Data collection methods used during this research include interviews and direct observations.

3.5 Research questions

This research has three main objectives. Firstly, to identify user adoption constraints faced by SMMEs during the adoption of an ERP system. Secondly, to develop a User Adoption model that

would be useful to SMMEs during the adoption of an ERP system; and lastly to assist SMMEs during an ERP implementation.

The above research objectives were achieved by investigating the following research questions:

- What adoption constraints do users in SMMEs face during an ERP implementation, in emerging economies?
- How can users be facilitated during an ERP implementation?
- What can influence the users' system perceptions?

Through using AR as the predominant research method, the following secondary research questions were derived.

- What problems do users' face, and what effect does the new ERP package have on the users' job performance?
- What facilitating conditions are available, and are they useful to assist users during the implementation process?
- What communication is available before and during the ERP implementation?
- What are the users' attitudes towards the ERP system?
- What can be done to improve their affective response to the system?

3.6 Research framework

AR is focused on solving problems and developing theory; thus the researcher should work within a conceptual framework when conducting research (McKay & Marshall, 2001). The actions taken to solve the problems during the study should be aimed at developing, testing and refining theories within a specific domain of research (Susman & Evered, 1978). During this research, the aim has been to collaborate with practitioners during an ERP implementation, and to identify and solve User Adoption constraints.

Most qualitative research methods are associated with understanding the social phenomena, but AR deals explicitly with planned intervention. CAR is based on planned theoretical-based intervention (Davison et al., 2004). It is thus important to have a planned theoretical framework to work from before an intervention can take place (Kock, 2007). Yet there are many instances where the issues are not well understood before interventions take place. Therefore a literature review has been done to understand the theory and current models of User Adoption.

Factors have been identified for achieving ERP implementation success. These factors were identified from multiple readings of previous ERP adoption studies (Table 4).

3.7 Data collection

Using AR the researcher intervened in the SMMEs and observed the social settings within which the research took place. During the ARC, certain actions took place to facilitate User Adoption and the social setting changed state (Baskerville, 1999). These actions were observed and the

social setting which changed state after the event took place was observed. The state changes provide the filter for the critical data in AR and the things that change after the event has taken place (Baskerville & Wood-Harper, 1998).

3.7.1 Sampling strategy

The target population during this study was focused on SMMEs in Cape Town South Africa. Table 5 below gives a summary of the sampling strategy for this study. Purposive sampling was used. The organisations selected were chosen with a specific purpose in mind. The purpose was to select organisations (SMMEs) which were currently implementing ERP packages at the time this research was conducted.

Table 5: Summary of sampling strategy

Key issues	Description
Sampling technique	Purposive, non-probability sampling.
Unit of Analysis	Organisation.
Target population	SMMEs in Cape Town, South Africa.
Sampling frame	SMMEs implementing an ERP package.
Size of the sample	Two organisations (SMMEs).

CAR is an iterative process, and this method allowed the researcher to make changes as part of the research cycle. The actions taken during the first ARC (first organisation) were improved and implemented during the second ARC (second organisation). Thus, two organisations were selected during this research process to determine if these actions were successful. These two organisations within the business services and manufacturing industry sectors were implementing the same ERP package at the time of this research. Detailed descriptions of these organisations are presented in Chapters 4 and 5.

This research focused only on ERP implementations in two organisations due to the nature of the AR process which is time-consuming. This process was iterative and involved two ARCs. Appendix C presents detailed case studies of these organisations.

3.7.2 Collection strategy during each AR phase

Multiple data collection methods were used during this case study; this ensured triangulation, which included cross-checking for internal consistency and reliability of the data, throughout this study. The primary data gathering techniques were participant observations and semi-structured interviews. Secondary data collection included using action experiments and written cases as part of the ARC (Baskerville, 1999). A five-stage CAR cycle was used with each phase needing to be completed before the next phase of the cycle could take place. Each phase required specific tasks to be completed. Data was collected during three (diagnosing, evaluation and specified learning) of the five phases of the ARC.

The constraints that users experience were identified during the action diagnosing phase; thereafter the action-taking phase of the ARC followed. Data was also collected during the evaluation phase of the ARC. During this phase, semi-structured interviews were used to collect data.

Qualitative interviews are the most important data gathering tool in qualitative research. These interviews allowed the researcher to see and examine phenomena and view the things, which could not usually be seen through quantitative analysis (Myers & Newman, 2007). Semi-structured interviews were conducted with users in the SMMEs; these interviews were taped and transcribed. Semi-structured questions were derived from the User Adoption model (Seymour and Roode, 2008). Table 6 presents a summary of the data collection strategy for the ARCs.

Table 6: Summary of data collection strategy for the AR cycles

Action Research phase	Data collection techniques
Client – System Infrastructure	No data was collected during this phase.
Diagnosing	Semi-structured interviews, observations, and documentation.
Action-planning	Data was not collected during this phase. Analyses took place during this phase using grounded theory techniques. Coding methods used were open, axial and selective coding.
Action-taking	Memos and notes were taken, and observations from the action-taking phase.
Evaluating	Semi-structured interviews and participatory observations.
Specify learning	No data was collected during this phase.

Table 7 characterises the interviewees during the first ARC. A total of 12 interviews were conducted during this research all within the marketing department. Seven of the 12 interviews were conducted during this ARC. Of these seven interviews, four interviews took place during the diagnosing phase of the ARC and three during the evaluation phase of this ARC.

Table 7: Action Research Cycle 1 – Interviews

Respondent	Years in the organisation	AR Phase
1 ARC1	11 years	Diagnosing Phase
2 ARC1	17 years	Diagnosing Phase & Evaluating Phase
3 ARC1	5 years	Diagnosing Phase
4 ARC1	7 years	Diagnosing Phase & Evaluating Phase
5 ARC1	13 years	Evaluating Phase

Table 8 gives an outline of the semi-structured interviews conducted during the second ARC. During this cycle five interviews took place. The duration of each interview ranged between 30 and 45 minutes. Of these five interviews, three took place during the diagnosing phase of the ARC and two during the evaluation phase of the first ARC.

Table 8: Action Research Cycle 2 - Interviews

Respondent	Years in the organisation	AR Phase
1 ARC 2	24 years	Diagnosing Phase
2 ARC 2	25 years	Diagnosing Phase
3 ARC 2	31 years	Diagnosing Phase
4 ARC 2	30 years	Evaluating Phase
5 ARC 2	7 years	Evaluating Phase

3.7.3 Research time frame

AR was the predominant method used during this research, since this method is applicable to study a phenomenon and to make changes as part of the ARC. The time horizon for this study was longitudinal and iterative compared to cross-sectional. When data is gathered continuously during the study it is not cross-sectional but longitudinal (Cavana et al., 2001). The aim of AR is to solve a problem in the complex social setting. If the problems identified are not solved within the first iteration of the ARC, a second cycle will need to be done to refine the User Adoption model used during the first ARC.

3.8 Data analysis

AR is a qualitative research method which is focused around the collaboration between the researcher and the practitioner. One of the criticisms of AR is that it lacks rigour (Baskerville & Pries-Heje, 1999). To improve rigour as part of theory formulation, Grounded Theory Methodology (GTM) can be applied as part of the AR process (Glaser & Strauss, 1977). GTM can be integrated into the ARC to add rigour and increase reliability during the theory formulation process (Baskerville & Pries-Heje, 1999). GTM were used to analyse the data and to refine a User Adoption Framework. The next section identifies how grounded theory methodology was used during this research.

3.8.1 Grounded theory methodology and analytical methods

GTM is a methodology founded by Glaser and Strauss (Glaser & Strauss, 1977). From the Glaserian and the Straussian versions, a third strand has been identified known as the Mixed GTM approach. Other forms of grounded theory have been used such as Grounded Action Research and Grounded Case Study approach (Eisenhardt, 1989).

Recent research shows that there has been a growing awareness of applying GTM analytical methods in Qualitative Data Analysis (QDA) for Information Systems research (Matavire & Brown, 2008). Figure 12 gives a summary of the four Grounded Theory approaches.

Approach	Principles	Coding	A priori Theory	Paradigm model	Typical Refs
Glaserian	Required	Open, Selective	No	Viewed as family of codes	Glaser & Strauss (1967); Glaser (1992)
Straussian	Required (Glaser disputed adherence)	Open, Axial, Selective	No	Greater emphasis	Strauss & Corbin (1990, 1998)
Analytical	Not necessarily	Any or all used	Maybe used	Some times used	Variety
Mixed	Not necessarily	Any or all used	Maybe used	Some times used	Mingers (2001)

Figure 12: Grounded Theory Approaches (Matavire & Brown, 2008)

The Mixed Grounded theory approach was used as part of this research. A prior model was studied and used before the researcher entered the diagnosing phase of the first ARC. Data was collected and once the data was analysed using grounded theory coding techniques, this resulted

in a new research model for SMMEs. Coding procedures using grounded theory techniques involve three kinds of coding: open coding, axial coding, and selective coding (Matavire & Brown, 2008). Grounded theory techniques provide a rigorous theory development technique for action research (Baskerville & Pries-Heje, 1999).

The goal of grounded theory is to develop a theory which is closely and directly relevant to a particular setting under study (Baskerville & Pries-Heje, 1999). Coding is an analytical process where data gathered is fractured, conceptualised and integrated to form theory. Open coding, axial coding and selective coding were applied to the data. Open coding is a process whereby concepts and categories are identified in the data. Constant comparison took place during this phase, and these concepts formed the building blocks of the theory. Axial coding is the next phase where the main categories identified in the previous phase are linked to their sub-categories. Subcategories answer questions such as who, where, when, why and how, about the main category. Axial coding improves the understanding of the data through connecting the various concepts and categories and subcategories identified (Baskerville, 1999). The last stage is selective coding where open coding ends and only variables related to the main category are identified (Matavire & Brown, 2008). Selective coding is the process where coding only take place around the main category. This category must be central and all the other categories must relate to this category. In all of the cases there must be a main category pointing to this category (Strauss & Corbin, 1990). Table 9 gives an overview of the different grounded theory techniques that were used during each phase of the ARC.

Table 9: Summary of data analysis strategy

Action Research phase	Data analysis strategy
Client–System Infrastructure	No data analysis will take place during this phase.
Diagnosing	Memos, field notes and transcripts were coded to identify the problems. Open, axial and selective coding was applied to the data.
Action-planning	Open, axial and selective coding.
Action-taking	During this phase the outcome of the actions taken was recorded and observed.
Evaluating	Open, axial and selective coding.
Specify learning	Axial and selective coding will continue to determine a new core category or story line.

3.9 Ensuring research quality and rigour of qualitative research

To ensure quality throughout this research, clear justifications for the methods used, findings and conclusions are given. To improve validity in qualitative research, thorough explanation of the decisions and steps taken needs to be described. Anfara, Brown, and Mangione (2002) presented

the following criteria to ensure quality and rigour during qualitative research: credibility, transferability, dependability and confirmability.

Credibility includes a long period of engagement in the field, the use of peer debriefing, triangulation, member checks and time sampling (Anfara et al., 2002). During this ARC, the researcher collected data during two of the five phases at two different time periods. Triangulation was ensured through gathering data from multiple data sources which included observation, interviews and the literature.

Transferability includes providing detailed descriptions and purposive sampling (Anfara et al., 2002). During this research, transferability was ensured through clear detailed descriptions and lifting quotes from the transcribed interviews. Purposive sampling was used in this research, which means that organisations were selected with a specific purpose in mind. Two organisations (SMMEs) which were implementing ERP packages at the time this research was being conducted were selected. Since CAR is an iterative process, the researcher decided to conduct research in two implementations. Purposive sampling was also used to identify the respondents interviewed in these organisations. The purpose of this sample was to select users within these organisations who would be using the new ERP system post-implementation. Table 10 presents the research questions in relation to the interview questions. Each of the interview questions are coded according to category (I, F, C, J and S) and number (1 to 9). The details of these interview questions are presented in Appendix A.

Table 10: Research questions in relation to interview questions

Research questions	Interview questions
<p>What adoption constraints do users in emerging economies face during an ERP implementation?</p> <p>Through participatory observation the problems faced by users were studied to explore the impact the new ERP package had on users' job performance.</p>	I1,I2,I3
<p>How can users be facilitated during an ERP implementation?</p> <p>What facilitating conditions are available, and are they useful to assist users during the ERP implementation?</p>	F1,F2,F3,F4,F5, F6,F7,F8,F9
<p>What can influence the users' system perceptions?</p> <p>What are the users' attitudes towards the ERP system?</p> <p>What communication is available before and during the ERP implementation?</p> <p>What can be done to improve effective response to the system</p>	C1, C2, C3 J1, J2,J3, J4, J5, J6, J7 S1,S2,S3,S4,S5,S6,S7,S8

Dependability includes creating an audit trail, code-recode strategy, triangulation and peer examination (Anfara et al., 2002). A clear audit trail was used throughout this research, each step and decision was clearly described during each phase of the ARC. Grounded theory analytical techniques were used as the code-recode strategy. Triangulation was used, since data were gathered from interviews and observations at two different periods and from multiple sources.

These data from various voices were collected and analysed in order to ensure reliability and validity of data.

Confirmability includes triangulation and reflexivity (Anfara et al., 2002). During the specifying phase of the ARC, confirmability was ensured. Reflexivity reflects on the research process and the decisions taken during each phase of the ARC.

One of the problems in qualitative research is that the researcher does not always inform the reader how the research questions and data sources are related (Anfara et al., 2002). Research questions provide the cornerstone for the analysis of the data; the researcher should form interview questions to cross-reference the research questions (Anfara et al., 2002). Appendix A shows the research questions and the corresponding interview questions for this research. These questions were derived using the User Adoption Model (Seymour and Roode, 2008) as guideline.

3.9.1 Validation of action research

AR has contributed to the field of Information Systems because of its relevance. Street and Meister (2004) used a set of criteria to evaluate their AR process. These same characteristics have been adopted and were used to identify the credibility, fittingness, auditability and conformability during this research.

Credibility refers to the faithful description and interpretation of human experiences, to enable people having these experiences to recognise and understand these interpretations. During the AR process, the following AR characteristics ensured that the research is credible. The observations were recorded and analysed in an interpretive frame; the data collected were socially constructed throughout the research interaction, and the stakeholders' viewpoints were compared and considered throughout the analysis phase of this research.

The research took place in a multivariate social situation. Triangulation took place throughout the research since data were collected from multiple data sources: from observations, minutes of meeting and semi-structured interviews. This ensured that sufficient data were collected to provide rich insight into the research. The changes taking place in the social setting were observed and analysed. The participant roles are also expected to change during the AR process; these changes were observed and analysed and the findings included in the results.

Fittingness was achieved through refining a change management framework from the findings of this research. After the analysis phase, a change management framework was presented. The details of the changes that took place were related to general concepts and the nature of the changes that took place during this study were explained. Auditability was achieved through describing a clear decision trail as part of the ARC. The steps taken throughout the ARC were documented and described.

Conformability relates to the things that should be known in the interest of truth (Street & Meister, 2004). This was achieved through ensuring direct research participation and action intervention in the research setting. There was interaction between the researcher and the participants throughout the ARC. The researcher engaged in principal stakeholder activities. Data were

collected through participatory observation, and the researcher developed the research context through observing the actual environment in which the participants work.

3.10 Timeline

Table 11 gives an overview of the timeline (2010) of this research project.

Table 11: Timeline summary

Action Research Phase	Implementation 1	Implementation 2
Phase 1: Diagnosis phase of the ARC	25 June – 5 July	3 July – 6 September
Analysis of phase 1 of ARC: using Grounded Theory techniques.	5 July – 28 June	5 July - 6 September
Phase 2 & 3: Action-planning & Action-taking	8 July – 9 July	7 September – 25 September
Phase 4: Evaluation	10 July – 1 August	25 September – 10 October
Analysis of phase 4: Using Grounded Theory techniques	1 August – 10 August	10 October – 30 October
Phase 5: Specify learning	10 August – 15 August	1 November – 15 November

3.11 Confidentiality & Ethics

Information about the ERP vendor, organisation and individual participants was treated with strict confidentiality during this study. Written permission was obtained from all the participants and consent forms were signed by the participants before interviews took place. Prior to entering the research setting, details regarding confidentiality and ethics were set out and agreed between the researcher and the host organisation.

3.12 Expected difficulties and limitations

This study is part of a Master's study in Information Systems. The predominant research method is CAR, which is characterised as an iterative, rigorous and collaborative process. The aim of this study is to present a model to assist SMMEs during an ERP implementation. But due to time constraints, only two ARCs have been conducted. As a result of only conducting two ARCs, the research model could only be refined once and findings from only two organisations are shared.

3.13 Summary of research

This section summarises the research process that has been followed during this study (Table 12).

Table 12: Research summary

Research context	ERP implementation in SMMEs (South Africa)
Research purpose	Exploratory (diagnosis and action-taking phases) & explanatory (evaluation and specified learning)
Research epistemology	Interpretivism
Research method	Action research (CAR)
Research strategy	Case study (ERP implementation)
Data-gathering techniques	Qualitative Participatory observation Semi-structured interviews Memos and minutes of meetings Secondary sources (Articles and books)
Data analysis	Qualitative, Grounded theory techniques
Time frame	Longitudinal

4. Description of Action Research Cycle Action Research Cycle (ARC) 1

This ARC is the first of two ARCs that took place during this research project. The researcher joined the host organisation to assist users two weeks prior to the implementation taking place.

The aim of this chapter is to discuss the first ARC which took place during this research project. Section 4.1 provides an overview of the case study and provides a description of the organisation where the research took place. Section 4.2 provides the initial research questions, which was revised during the second ARC. Section 4.3 describes the results and the analysis process which took place. Sections 4.4 to 4.10 describe each of the phases which took place within this research project. The chapter is concluded with a summary in Section 4.11.

4.1 A case study using action research – Case 1

Prior to entering the research cycle the researcher decided to select a medium-sized organisation implementing an ERP system. There are various ERP products within the SMME ERP space. An ERP product with a strong market presence both in Africa and within the current SMME ERP space was preferred. The researcher compared various implementation projects, but strategically decided to select an organisation with less than 200 employees and more importantly, a host organisation and ERP reseller that would allow the researcher to join the project prior to the organisation implementing the ERP system.

A medium-sized organisation with 131 permanent staff members in two branches in Johannesburg and Cape Town was selected, based on the aforementioned criteria. The organisation specialises in service delivery (business services industry) through the provision of learning resources to various clients in South Africa. Management of this organisation decided to replace their legacy system with a new ERP system. The previous system had been used within the organisation since 1989. The new system sought to integrate all the business units into one new ERP package, and thereby combine the stock, financial and sales business units into one integrated platform. (Appendix C presents case studies on this organisation and the ERP reseller).

Role and agreement

In initiating AR, the client-system infrastructure is the specification and agreement that constitutes the research environment. It provides the authority, or sanctions, under which the researcher and the practitioners may specify actions. This agreement also legitimises those actions with the expectation that eventually these will prove beneficial to the host organisation (Baskerville & Pries-Heje, 1999). During this research cycle, agreement was reached between the researcher and the host organisation prior to the ERP implementation to allow for the identification user constraints and to reduce these constraints during the implementation.

4.2 Research questions for ARC 1

The following research questions were investigated:

- What adoption constraints do users face during an ERP implementation, in emerging

economies?

- How can users be facilitated during an ERP implementation?
- What can influence the users' system perceptions?

As a result of the outcome of this research cycle these questions were modified and additional research questions were added during the second ARC (Chapter 5).

4.3 Description of ARC 1 - Phases

Multiple data collection methods were used during this case study; this ensured triangulation throughout this study. The primary data gathering techniques were participatory observations and semi-structured interviews. The interviews were conducted during two phases of the ARC: the diagnosing and the evaluation phases. A total of 12 interviews were conducted during the course of the study and out of those, seven during the first ARC. Of these, four interviews took place during the diagnosing phase of the ARC and three during the evaluation phase of the cycle after the implementation actions had taken place. Most of the interviewees were from the Sales department of the organisation, excluding one from Production. Table 13 below gives an overview of the interviews that were conducted during this research cycle and identifies in which AR phase these interviews took place and their educational background.

Table 13: Semi-structured interviews - ARC1

Respondent	Years in the organisation	Educational Background
1 ARC1	11 years	Marketing Diploma
2 ARC1	17 years	National Secretarial Certificate
3 ARC1	5 years	Matriculated
4 ARC1	7 years	Matriculated
5 ARC1	13 years	Matriculated

This research model presented was refined (by collecting data during four phases at different intervals) throughout the data collection stage of this study using grounded theory techniques and through constant comparative analysis. Constraints specific to SMMEs within an emerging economy are highlighted.

The research investigated User Adoption during ERP implementation. From an AR/grounded theory perspective, this means that the action research began as a second-stage research project. During this research cycle, the data collected included: minutes of meetings, observations and seven semi-structured interviews.

In the following section, an explanation as to how data analysis took place during the diagnosing phase of ARC1 will be presented.

4.4 Diagnosing Phase

The diagnosing phase of this research cycle took place one week prior to the organisation's implementation of the new system. During this phase, data analysis continued, using grounded theory techniques. During this phase, the field notes taken during two meetings prior to the implementation and four interview transcripts were transcribed and analysed using the aforementioned grounded theory techniques. Each of the interviews conducted were between 30 and 45 minutes in length.

4.5 Diagnosis Summary

A Microsoft Excel spreadsheet was used as a coding aid. Each User Adoption concept and category was coded based on the guiding research questions. It is necessary to highlight that it is possible for a text excerpt to be coded into multiple concepts and categories. In the analysis, the researcher mainly focused on what was wrong and what should be done correctly to improve User Adoption during implementation.

4.6 Action-Planning Phase

During the action-planning phase, the researcher collaborated with ERP consultants to assist during the implementation. The on-site meetings that took place were a combination of short discussions and teleconference calls with the management. During the action-planning phase, decisions were made regarding the data take-on and conversion which took place from the legacy system to the new system. The researcher was involved with planning the training sessions and timeline for when the training would take place. The researcher was seen as part of the team of consultants implementing the ERP package (the researcher was introduced to the implementing organisation as a researcher and student). Although only limited time was spent on this since technical issues were prioritised over user training.

4.7 Action-Taking Phase

During the action-taking phase, the researcher assisted during the two-day training which took place. Twelve of the users were present during the first day of the training. This was the first time that the users were exposed to the new system.

A limited amount of time was spent to plan user training. During the two-day training session, most of the problems were technical in nature. The planned agenda for the training session was not followed since the users' computers and network problems hampered the transactions from taking place. The researcher took field notes during this phase and assisted users where appropriate.

On the second day of training, only seven users returned to complete the training session (five users did not return to the training session). It was clear that management did not force users to attend the training and that this was optional. As a result, not all the users were exposed to the new system prior to "going live."

During these two days, it was clear that the perceptions the users had, and the reality of what they would be using, differed. During these two days, users raised concerns regarding the

complexity of the system and the increased workload because of the large amount of input when compared to the previous system they were using. A majority of these issues highlighted the difficulties users face with the new terminology of the system. Most of the users present during the training session had been part of the organisation for more than seven years. The reality of changing general terminology used within the organisation to ensure that it fitted in with the new system, posed a challenge for them.

One of the users interviewed pre-implementation, who had been very positive about the implementation, resigned after the first day of training. It was clear that the new system and the changes posed a great threat to the users.

4.8 Evaluating Phase

During the evaluation phase of this ARC, the researcher returned two weeks post- implementation to conduct follow-up interviews and to observe the users working on the new system. Three follow-up interviews were conducted during this time and furthermore, the researcher spent one day observing the users working on the new system.

From the five users initially interviewed, only two were available for a follow-up interview and one interview was conducted with a user who was only partially using the new ERP system. Table 13 indicates the number of years that the users were part of the organisation and the educational background of each user.

During the evaluating phase, grounded theory techniques were used to analyse the data from the interviews and notes taken during the observations. The research questions were always kept close at hand to ensure that the research objectives were met at the end of the research cycle.

4.9 Evaluating Summary

During the evaluating phase, the researcher realised that multiple User Adoption constraints which include lack of resources, negative job impact, poor facilitating conditions, unrealistic system expectations and system perceptions posed a great threat to the success of the implementation (details of the findings are described in Chapter 6). It was clear that integration problems and database concerns were a much greater priority to the consultant and to the host organisation. Users were completely neglected and no facilitating conditions were available at the time the follow-up interviews were conducted. Even though the consultants (which implemented the ERP package) were present post-implementation there was no time for the consultant to assist users, but most of the time was spent attending to the technical problems on the server.

4.10 Specify Learning

Findings indicate that users from different business units view an ERP implementation differently. The users from the Production unit remained positive throughout the implementation. Even though training was given to users, the way training was conducted also affects the user's response to the system (Seymour & Roode, 2008). During this implementation, no individual training was available to users, no training manuals were made available and internal business processes post-implementation was unclear to users.

4.11 Conclusion

It was clear since the start of this research that User Adoption constraints were dynamic, before, during and after an ERP implementation. During this ARC, the ERP implementation resulted in a large amount of user adoption constraints related to poor management of the project and insufficient training and insufficient planning, pre-implementation. During ARC 2 (Chapter 5), the researcher decided to address these user constraints pre- and post-implementation.

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5. Description of Action Research Cycle (ARC) 2

This chapter presents the description of the second ARC, which took place over a period of four months; the diagnosing phase started six weeks prior to the implementation.

The aim of this chapter is to discuss the second ARC which took place during this research project. Section 5.1 provides an overview of the case study and research setting. Section 5.2 provides the revised research questions. Sections 5.3 to 5.7 describe each of the phases which took place within this ARC. The chapter concludes with a summary in Section 5.8.

5.1 A case study using action research - Case 2

The organisation selected for the study was a medium-sized organisation (manufacturing firm in South Africa) with 170 permanent staff members. Most of the internal processes of the organisation have remained the same since the creation of the organisation and a manual system was still in place. This manual system was kept as a backup to do stock checks and to control the information flow within the organisation. Management decided to implement a new ERP package. The previous ERP system had only been used in their Accounts department and partially in the manufacturing section of the organisation. The new system integrated the entire organisation.

The researcher joined the implementation during the requirements gathering phase. The researcher observed and participated in the phase and assisted with prototype development prior to implementation. (Appendix C presents case studies on this organisation and the ERP reseller).

Role and agreement

The researcher joined the ERP implementation six weeks prior to the planned “go live” date. This allowed the researcher sufficient time to plan and contribute to this implementation. Consequently this allowed the researcher to acquire sufficient knowledge regarding the business processes and information flow. As a result the researcher could identify the specific roles the users had within the organisation and could plan effectively on how the roles would change post-implementation.

The host organisation signed a “Client-Researcher Infrastructure Agreement” allowing the researcher to observe and assist the users and ERP consultants throughout the implementation.

5.2 Research questions for ARC 2

During the second ARC, the research questions were modified to supplement the findings of the first ARC and to identify the specific constraints users faced before and after an ERP implementation. The questions were thus:

- What adoption constraints do users face before, during and after an ERP implementation, in emerging economies?
- How can users be facilitated during an ERP implementation?
- What can influence the users' system perceptions?

- How do User Adoption constraints differ within different industry sectors?

5.3 Description of ARC 2 - Phases

Multiple data collection methods were used during this case study; this ensured triangulation throughout this study and was in line with the Grounded Theory tenet that “all is data.” The primary data gathering techniques were participatory observations and five semi-structured interviews. Four of the interviews were conducted with users from the Manufacturing and Stock Control departments of the organisation, except one who was from the Administration department. Table 14 identifies the years in the organisation and educational background of each of the interviewees and job titles.

Table 14: Semi-structured interviews ARC1

Respondent	Years in the organisation	Job Titles	Educational Background
1 ARC 2	24 years	Accountant	Financials
2 ARC 2	25 years	Quality Controller	Matriculated
3 ARC 2	31 years	Production Controller	Technical College
4 ARC 2	30 years	Buyer	Grade 8
5 ARC 2	7 years	Production Controller	Grade 10

5.4 Action-Planning Phase

The training during this research cycle was planned. During the action-planning phase, the researcher and the consultant collaborated in planning which of the users would be involved post-implementation, and in planning the group training sessions. Two group and numerous individual training sessions took place during this study. The researcher participated by giving individual training sessions to users on the factory floor.

The diagram in Figure 13 below was used to identify the internal processes which will change post-implementation and which of the users will be a part of the different business processes. It depicts the notes made by the consultant and the researcher during the planning phase of this ARC.

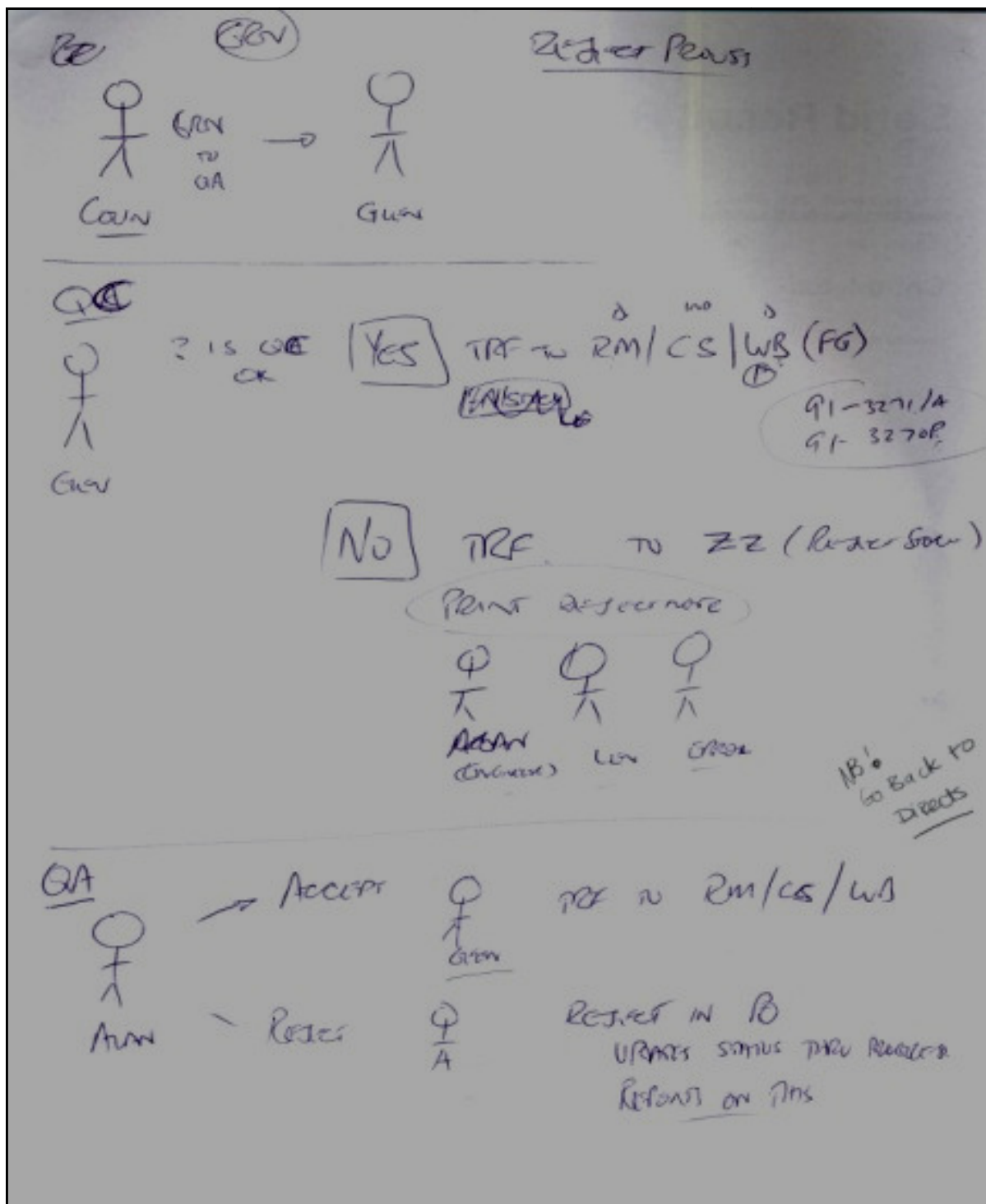


Figure 13: Notes made during planning phase by Consultant and Researcher

'User diagrams' were put together for each user to identify the user role which they would have post-implementation. These were added to the training manual to identify the 'user-specific' roles and to give the users a holistic view of how they would fit in the new system. The diagram in Figure 14 below identifies the users and document flow for the receiving process.

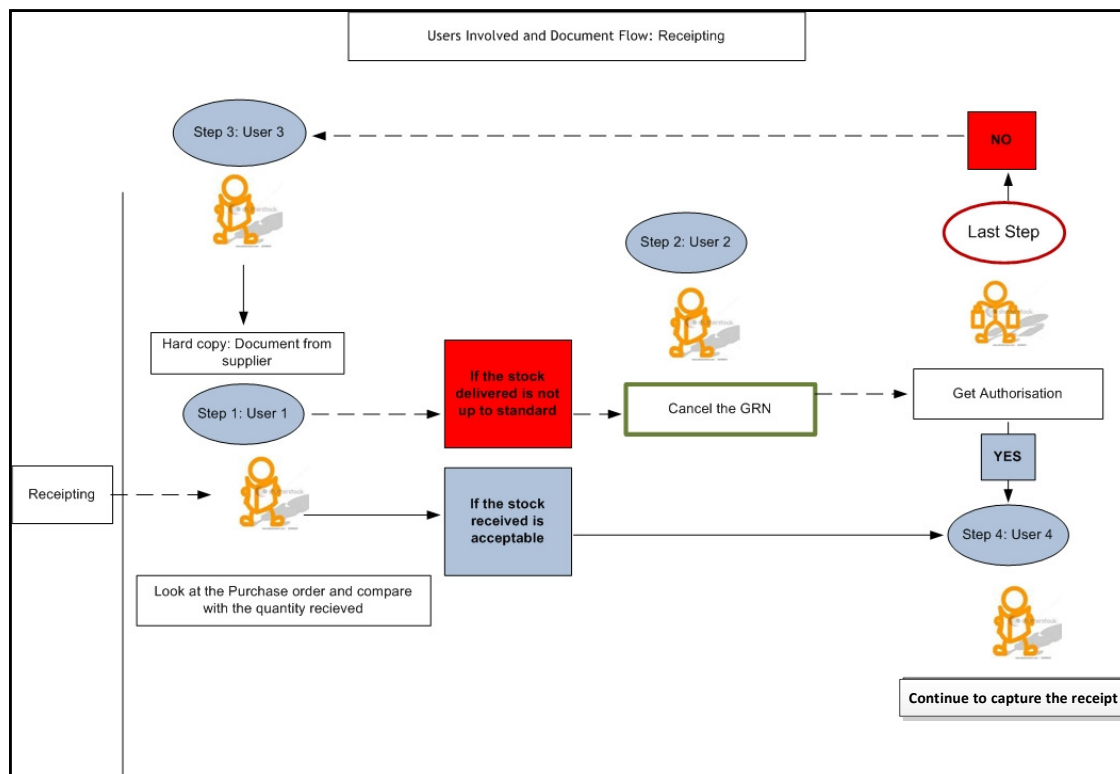


Figure 14: User diagram added to training manual

5.5 Action-Taking Phase

During the action-taking phase, the researcher and the consultant collaborated in conducting a group training session. During this session, each of the users received a training manual (prepared by the researcher) and each one's role was identified and described to them. User training continued throughout the implementation. The researcher conducted individual training on the manufacturing floor and modified training material to meet user requirements.

5.6 Action Evaluation Phase

During the evaluation phase of this ARC, the researcher returned one week after implementation to conduct follow-up interviews and to observe the users working on the new system. Two follow-up interviews were conducted during this time and the researcher spent three days observing the users working on the new system.

5.7 Specified Learning Phase

During the second ARC, user constraints were addressed based on the findings of the first ARC. During implementation, individual training was available to users and training manuals were given to each individual user. A group training session was organised with the users to discuss roles once the implementation took place.

Users' overall comment on the documentation and training manuals was that the manuals were too complicated and that the training should have been slowed down. Users on the factory floor asked for documentation on navigation within Windows (basic computer literacy skills) and

simpler descriptions on the screens. It was evident during this research cycle that users with low computer literacy faced increased user constraints than compared to users in the first research cycle. It was observed that users in the manufacturing industry sector face an increased amount of user adoption constraints when compared to users in the business services industry sector (details of these findings are discussed in Chapter 6).

5.8 Conclusion

It was clear during this ARC that the users needed additional computer training on basic navigation on Windows prior to the ERP training. There was neither a budget nor planning done to assist and facilitate these users. The researcher felt that it is important to emphasise that facilitating User Adoption was not even considered as part of the project plan. The implementation was seen as a success if the technical part of the implementations was a success and no communication between the users and the reseller consultants took place post-implementation. A detailed discussion of the findings is presented in Chapter 6.

University of Cape Town

6. ARC1 & ARC2 Data Analysis

This Chapter provides a detailed description of how Grounded Theory techniques were applied as part of the data analysis process. Sections 6.1 and 6.2 provide a high level description of the open coding process. Section 6.3 describes the steps which were taken during the diagnosing phase, and Section 6.4 describes the final concepts identified during the open coding process. Section 6.5 presents the open coding results and relevant text excerpts for each code, and Section 6.6 presents the final concepts with properties and dimensions for each. Section 6.7 presents the axial coding links identified during this research, and concludes the Chapter.

6.1 ARC1 Diagnosing Phase Analysis – Open Coding

During the open-coding process, the research questions were always kept close at hand to ensure that the research objectives were met. Open coding is the process where concepts are identified and elaborated through definition of their properties and dimensions. The properties are the characteristics that define a concept and give it meaning while the dimensions are the range along which a property varies (Brown & Roode, 2004). This section describes the process of how the categories emerged during the diagnosing phase of this ARC 1.

The four interviews conducted during the diagnosing phase of the first ARC were transcribed and read to identify references to user constraints identified during the research cycle. Text excerpts were taken from each of the four interviews. The interview questions were kept close at hand to ensure that all the excerpts were relevant to the research objectives. During the first iteration of open coding, 112 text excerpts were identified, and then re-evaluated before assigning a conceptual label to each excerpt.

Each of the conceptual labels assigned were re-evaluated separately. A conceptual label was assigned to each text excerpt and a total of 109 labels emerged. The researcher went back to the text to study the individual text excerpts before assigning a final concept to each of the conceptual labels. A total of 11 concepts emerged during the diagnosing phase of this ARC. These concepts are: user communication, hierarchical communication, training quantity, user expectation created by management, shared beliefs among users, improved functionality, value of the new system, workload and task completion, confidence among users, consultation with users and project control.

Using grounded theory techniques and through constant comparative analysis, the concepts identified during this diagnosing phase were grouped into five main categories. These categories are facilitating conditions, system expectations, system perceptions, implementation actions and organisational culture.

6.2 ARC 1 Evaluating Phase Analysis – Open Coding

During the Evaluating Phase of the first ARC open coding continued.

The three interviews were transcribed and read to identify references to user constraints identified during the ARC. Text excerpts were taken from each of the three interviews. During the first iteration of open coding, 114 text excerpts were identified.

Through comparative analysis and removal of duplicates, the text excerpts were reduced to 92. Each of the 92 text excerpts were evaluated separately. The researcher then went back to the text to study the individual text excerpts identified before assigning a concept to each. A total of 25 concepts were identified during this phase. Two new categories emerged, these being **Job Impact** and **Resource Constraints**.

6.3 ARC 2 Diagnosing & Evaluating Phase Analysis – ARC 2

During the diagnosing phase, data was collected through three semi-structured interviews and observations. Grounded theory techniques were used to analyse the data.

From the interviews conducted, 70 text excerpts were evaluated. Previous concepts were assigned to each individual text excerpt and one new category emerged organisational culture (During ARC 2 this category merged with 'Industry Sector'). By comparative analysis, and removal of duplicates, the text excerpts were reduced to 62.

Each of the concepts previously identified during the diagnosing phase of the first ARC were used as primary concepts and the researcher was sensitive to new emergent concepts and categories.

During the evaluation phase of this ARC, the researcher returned one week after implementation to conduct follow-up interviews and to observe the users working on the new system. Two follow-up interviews were conducted during this time and the researcher spent three days observing the users on the new system.

From the 122 text excerpts identified during the evaluation phase, concepts were assigned to each individual line and the researcher was sensitive to identifying any other emergent ideas. By comparative analysis and removal of duplicates, the text excerpts were reduced to 64. Of the concepts and categories identified during the evaluation phase of this research cycle, one new category emerged, that being Industry Sector and Organisational culture.

The researcher compared the two case studies and further added an additional category - Industry sector. This is accepted in grounded theory's conceptualisation, as the researcher moved from description to abstracting categories. There is no explicit reference to the construct in the interviews, however it was evident that User Adoption constraints cannot be generalised across industry sectors. Ultimately User Adoption constraints need to be addressed differently within each industry sector because of the differences in literacy and education levels in each industry.

6.4 Final Concepts – Open Coding

Table 15 identifies the count of each of the concepts and the related categories for both ARC1 and ARC2. Column one identifies the final categories which are facilitating conditions, system expectations, system perceptions, implementation actions, job impact and resource constraints. Two new concepts were identified, and; these are industry sector and organisational culture. Column two shows the final concepts identified during this research. A final of 22 concepts were identified during the study (Table 15). As shown in Table 15, DP refers to the Diagnosing Phase and EP refers to the Evaluation Phase of the ARC. Thus, “ARC1 DP” refers to Action Research Cycle 1 Diagnosing Phase and “ARC2 EP” refers to Action Research Cycle 2 Evaluation Phase.

Table 15: Total of each concept

Category	Concept	ARC 1 DP	ARC 1 EP	ARC 2 DP	ARC 2 EP	Totals
Facilitating Conditions	User Communication (ARC1 DP)	11	2	0	4	17
	Hierarchical communication (ARC1 DP)	8	1	7	2	18
	Training Quantity (ARC1 DP)	10	3	14	10	37
	System Support (ARC1 EP)	0	10	0	7	17
		29	16	21	23	89
System expectation	User expectation created by management (ARC1 DP)	7	6	2	1	16
	Shared beliefs among users (ARC1 DP)	8	2	3	1	14
	Improved functionality (ARC1 DP)	10	4	8	3	25
		25	12	13	5	55
System perceptions	Value of the new system (ARC1 DP)	14	15	13	1	43
	Workload and task completion (ARC1 DP)	5	0	1	1	7
	Confidence among users (ARC1 DP)	10	3	11	1	25
		29	18	25	3	75
Implementation Actions	Consultation with users (ARC1 DP)	12	4	8	4	28
	User documentation (ARC1 EP)	0	5	4	6	15
	Business Process Focus (ARC1 EP)	0	1	0	0	1
	Customisation (ARC1 EP)	0	6	0	2	8
	Testing (ARC1 EP)	0	1	0	3	4
	Project Control (ARC1 DP)	4	5	0	0	9
		16	22	12	15	65
Job Impact	Speed of task completion (ARC1 EP)	0	5	0	0	5
	Authorisation of the new system (ARC1 EP)	0	8	0	5	13
		0	13	0	5	18
Resource constraints	Technical constraints (ARC1 EP)	0	7	0	0	7
	Economic constraints (ARC1 EP)	0	2	0	0	2
		0	9	0	0	9
Industry Sector	Industry Sector (ARC 2 DP)	0	0	0	0	0
Organisational Culture	Organisational Culture (ARC 2 DP)	0	0	2	6	8

6.5 Open Coding Results

The sections below provide data evidence for each of the concepts identified during this research. Each of the concepts identified are described pre-implementation and post-implementation and supported by a relevant quote.

The four categories identified during the first ARC (pre-implementation) include facilitating conditions, system expectations, system perceptions and implementation actions. Job Impact and Resource Constraints were identified post-implementation.

6.5.1 Facilitating Conditions

According to Chang et al., (2008), facilitating conditions include hardware, software, network connection, training, information, etc., that allow individuals to access the ERP system when they want. Facilitating conditions could also include the support the organisation or ERP resellers provide to facilitate the use of the new system.

Various user constraints related to facilitating conditions were identified. These include limited user communication, hierarchical communication, training and system support. The next sections will highlight relevant text excerpts for each of the concepts identified for this category.

6.5.1.1 User Communication – frequency and accuracy

Pre-implementation

The researcher observed that all of the respondents had different information as to when the implementation would take place and users were notified at different intervals prior to the implementation. It was clear that users overall were very positive prior to the implementation. This was a result of frequent positive communication from the unit manager (ARC1) who was directly involved with the users. It was evident that decisions about the implementation and the time frame for the implementation changed constantly. This created mixed ideas and subsequently, inaccurate information was given to the users pre-implementation.

During the second ARC there was no manager available to communicate with users during the implementation. One user on the shop floor in the factory made the following comment: "...To be honest I was not informed, officially. I just heard about this via the grapevine..." [ARC2, Respondent 3, DP].

Post-implementation

User communication is important pre- and post-implementation. Observations indicated that informing users about the problems regarding the implementation and involving users during the implementation, decreased User Adoption constraints. Management communication during this implementation improved User Adoption and made them feel at ease to know that there was transparency regarding the implementation that was taking place. One user commented:

“... I don't even know how the system works, up to now they have never talked to us about the system, he never said anything that you people are going to come over and take over, nothing.” [Respondent 4, ARC 2, EP].

6.5.1.2 Hierarchical Communication

Pre-implementation

This concept refers to the level of user communication within the organisation. It was clear to the researcher that not all the users within the organisation received the same amount of information. Users lower in the hierarchy within the organisation received less information compared to users higher up in the organisation. Users in different departments received different information regarding the implementation. This is clearly a user constraint since this created distortion among users within different departments.

During pre-implementation, the users each spent time with the on-site consultant. “...we have got training scheduled next week you know the sixth and the seventh to go you know into detail how it is going to work. So far they have just told us the fields and how it is going to make our lives easier” [ARC1, Respondent 1, DP]. This specific user interview was an employee in the Accounts department in the organisation which received frequent information regarding the implementation.

Post-implementation

Besides various comments from the interviewees, the researcher would like to highlight the lack of communication within this organisation and especially when the implementation was taking place. It was clear from the observations that not all the employees received the same amount of information. Users at lower levels within the organisation received only a limited amount of information than compared to users higher up in the organisation.

When conducting interviews post-implementation the researcher asked a user if he knew about the implementation and he said the following: “Nobody had communication with us regarding that at all...” [ARC2, Respondent 5, EP]. The user quoted above has been a part of the organisation for more than 10 years and due to poor communication, the user was not officially informed about the new system.

6.5.1.3 Training Quantity

Pre-implementation

During the first implementation (ARC1), the project plan and budget allowed for a planned two-day training session. At the time the training took place, the project budget was overrun and did not allow for any further consultation with the users. As a result of this, two group sessions took place and no hours or budget was available for individual training. This caused frustration among users. The users felt that the training provided was not enough. The quotes below identify their feedback regarding the training:

“... and it was like a two-day workshop, we ran out of time... A lot of us had questions you know... It was very difficult for us to relate to this new system. It was ten times more involved than the old system ... But generally when sitting in the room, I mean, the other ladies were completely lost” [Respondent 1, ARC 1, EP]. It is important for management to plan effectively to ensure that the correct amount of training and the time provided for training is suitable for the group size per session.

During the second ARC, a user stated the following “... A minimum amount of training was given to us in a short space of time” [ARC 2, Respondent 3, DP]. The researcher observed that training of users was given very low priority during both ARCs; the budget allocation for training was very small than compared to the other sections in the project budget such as data imports and set-ups (technical concerns).

Post-implementation

There was a limited amount of training provided to the users as noted: “... You cannot pick up everything that they are going to show you on that day in five minutes.” [Respondent 4, ARC 2, EP].

Users during the second ARC had very low IT skills and a user stated: “What I would like is that not to train me when everyone else is around. There is a lot of disturbance and confusion like a laptop or a computer or whatever.” [Respondent 4, ARC 2, EP].

All of the users commented on the lack of training received post-implementation. The two-day training workshop was not sufficient to assist all the users (10 users) training requirements and go through all the functionality available on the system. The facilities where the training took place were uncomfortable and the one consultant could not assist all the users with their queries within two days. A user quoted the following: “...But generally when sitting in the room, I mean the other ladies were completely lost... Besides that I think it was just crammed a bit.” [Respondent 4, ARC 1, EP].

6.5.1.4 System Support

The most important facilitating condition is user support, post-implementation. One user stated the following: “Even the consultants are struggling to understand what is going on.” [Respondent 4, ARC 1, EP]. The users needed support and there was no one to assist them. The consultant was still trying to get all the technical issues out of the way before assisting the users.

Many of the users did not receive appropriate help and support during the implementation and a user commented: “...I don't actually know where to go if I would like to find out something ...” [Respondent 4, ARC 2, EP].

6.5.2 System expectations

User Adoption factors affecting system expectations among users include user expectations created by management, shared beliefs among users and functionality of the new system. Relevant quotes are highlighted below to support each of these concepts.

6.5.2.1 User expectations created by management

Pre-implementation

Most of the users expected the new system to be similar to the previous system or to at least improve the way in which they had been completing their daily tasks. The new interface of the system was much more user-friendly and colourful when compared to the previous system. A user stated the following "... but just the little bit I have seen from the new system, it is going to help us and benefit us a great deal" [Respondent 3, ARC1, DP].

Users overall were excited to use the new system, since their previous system was 17 years old and created many problems. A user commented on the following "... It is positive because we as the users of the previous system we have been experiencing a lot of problems with it, so I think..." [Respondent 1, ARC 1, DP].

The following quote identifies the expectations of the system pre-implementation: "Yes, and what I like about it, it is a web-based program so I can login wherever and I can access it from a ADSL or a 3G" [Respondent 1, ARC 1, DP].

During the training session, system perceptions changed within the group once the users were exposed to the new system; "Respondent 1, ARC 1" who has been an employee for 11 years submitted her resignation at the end of the first day of training. As a result, one-third of the employees did not return to the second day of training made available by the consultant. Tension was high during these training sessions, which increased anxiety among users.

At the time of the follow-up interviews, a second employee mentioned that she was looking for alternative employment. "Respondent 4, ARC 1" gave the following response: "I will resign. I must go and look for another job, because I cannot work in the new system the way it is now". The users quoted above were positive prior to the implementation, but their perception clearly changed once they were exposed to the new system.

Post-implementation

It was clear that none of the system expectations were met post-implementation. As promising as the system might have been, the lack of control and lack of facilitating conditions increased the confidence among users post-implementation.

This resulted in negative shared beliefs among users, as they felt that management created unrealistic expectations pre-implementation. A user is quoted as follows: "I think they sugar-coated it and said it was going to be easy and I promise you ... Well, there has not been any ease in this..." [Respondent 3, ARC 1, EP].

6.5.2.2 Shared beliefs among users

The benefit of an Information System in an organisation can be complex and subtle; users form beliefs about these benefits as individuals and shared beliefs with other users and managers (Amoako-Gyampah & Salam, 2004).

Pre-implementation

Most of the respondents were very positive and excited to use the new system. Users were ready to move away from the legacy system which they were using since it did not integrate with the rest of the applications within the organisation.

Users clearly realised the benefits that the new system would have for the managers. Improved report writing and increased audit trail would improve management decision-making. "In the new system I believe that a lot more information will be available to the managers..." [Respondent 1, ARC1, DP].

Post-implementation

The users' perception of the system clearly differed post-implementation. All the users were very negative at the time the follow-up interviews were conducted; the quote below highlights the dissatisfaction among users:

"Honestly, if I had to give any advice, it will put the people off the new system forever. Yes, we knew we were going over but we did not realise how difficult it would be" [Respondent 4, ARC 1, EP].

Users were very emotional post-implementation, and they had no way of expressing their concerns about the new system, since they understood that the software was already installed and that they were forced to adapt and use the new application. A user said the following: "...I wish they would just cancel the whole thing, honestly, cancel it. Let me work on the old system. It's ridiculous ..." [Respondent 4, ARC 1, EP].

6.5.2.3 Improved functionality

Pre-implementation

Pre-implementation, users were very positive and had the following comments: "...positive, it could be quite a good system..." [ARC2, Respondent 2, EP].

One of the users who had been part of the organisation for 17 years stated the following: "I think the general feeling is also a little bit of apprehension, because we are scared and it is new, because we have ... well, I have been working on our previous system for 17 years" [Respondent 2, ARC 1].

Users working on a manual system realised the benefits of the new system: "... I think the manual system was a very good system, but as I was saying ... technology ... we need to be conscious and it is not like the old days..."[ARC2, Respondent 3, DP].

Post-implementation

In the second ARC, users were very positive about the implementation because they were exposed to the new computer system with improved functionality. A user commented the following: "Yes, it improves the networking very much, because we never had computers before, but now we have computers and we can communicate with the others" [Respondent 5, ARC 2, EP].

6.5.3 System perceptions

6.5.3.1 Value of the new system

Pre-implementation

The quote below highlights the users' system perceptions pre-implementation:

"... They were not shocked ... I think that they are excited to see what the system is going to be like..." [ARC2, Respondent 2, DP]. A user commented as follows: "... I just hope that the new system will be as good as the old system..." [ARC 2, Respondent 2, DP]. The different roles users had within the organisation and their hierarchy influenced the way they perceived the system and its value. During the diagnosing phase, all users were very positive and excited to move away from the legacy system.

A second user said the following: "So how does it make me feel? I am excited about it." [Respondent 4, ARC1, DP]. Most of the positive user expectations were created by top management. This seemed appropriate and users overall embraced the idea of the new system.

During the second ARC, users were not as positive than compared to the first ARC; "... But the feeling amongst the guys is definitely not of such high level. If I had to say out of a hundred percent, I would say it is only 50 percent." [ARC2, Respondent 3, DP]. It was clear that not everyone saw the value of the new system.

6.5.3.2 Confidence among users

Pre-implementation

During the planning meetings prior to the implementation taking place, various problems were identified which could lead to User Adoption constraints. These included resource constraints within the organisation regarding the outdated computers. The new software (ERP package) did not seem compatible with the hardware and operating systems of the users' current computers and the organisation did not plan to replace these computers prior to the implementation. On average, the computers had been used in the organisation for six years. Resource-friendly applications such as Microsoft Word and Excel were unstable on these computers.

Respondent 4, ARC 1, EP stated the following:

"If I just look at it from a financial point of view in our business unit, you know, we are just struggling to keep our heads above water. I don't think the timing was right for changing the

system. Right now our focus should rather have been on getting our business unit financially viable and up and running than on spending and not on getting a new system.” [ARC1, Respondent 2, DP].

Many of the respondents commented on the lack of resources available within their organisation and they felt that the new implementation did not happen at the correct time. Overall the users did not feel that it was financially feasible for the implementation to take place. A second problem identified was regarding the conversion from the legacy system to the new system, which created anxiety among the users. It seemed problematic because of the large amount of data which had to be re-entered into the new system and a one-week parallel conversion would not provide the users with enough time to recapture the information which they needed into the new system. A respondent said the following when they heard that there might not be any parallel conversion:

“...at the moment, what we heard and what quite upset the appcart is that the new system and the existing system are not going to be available at the same time...” [Respondent 4, ARC 1, DP].

It was clear to the researcher that there was confusion regarding the decisions that were being made and that the users had limited opportunity to contribute or voice their opinions regarding top management decisions. The lack of user involvement during this project contributed to negative emotions among the users.

“... It was still interesting, but is very different to what we normally do. It gives a lot of headaches and a lot of problems.” [ARC2, Respondent 3, DP].

Post-implementation

Older users with low computer literacy levels had great difficulty in getting used to the new system. A user commented as follows: “... You look stupid going to call them all the time...” [Respondent 4, ARC 2, EP].

Many errors were still creeping in post-implementation and user requirements were not met. One user stated the following: “....It is not foolproof yet” [Respondent 4, ARC 2, EP].

Users who were completely dependent on the new system seemed to be less positive post-implementation compared to users who were only partially dependent on the new system to complete their tasks.

6.5.3.3 Workload and Task completion – post-implementation only

Users realised that the new system had far more text fields and screens to complete for their individual tasks than compared to the previous legacy system. A user commented as follows: “I think it is going to triple my workload because there is so much more information that needs to be put on the system. There is so much more to learn, it takes time to work things out in your mind on how you are going to get information, where to get the information and whether the information is there. It is just going to make my life so much more difficult until I understand it completely.”

[Respondent 4, ARC1, EP]. Another user responded: “It is too busy, and you have to click on too many various tabs to get where you want to go ...”

Some users who had been using the system for many years were quoted as stating: “No, as I said, as positive as I was, just as negative am I now. For me, it is a nightmare” [Respondent 3, ARC 1, EP].

Users could not complete their tasks at hand, and a user stated the following: “It’s not only impacting my workload, it is impacting my service delivery to my clients who are used to getting things between 30 minutes and one hour. With the quotation I was working on I had to sit for the entire day. I started yesterday morning and I sent it to her yesterday afternoon. And that was all I did.” [Respondent 3, ARC1, EP].

6.5.4 Implementation Actions

During ARC1 a limited number of implementation actions were available to assist users. No documentation or help files were available to the users in either of the implementations which took place. It was clear during the meetings prior to the implementation that there was no planning regarding how the business processes would change post-implementation. Most of the planning involved technical issues and decisions regarding the transfer of data from the legacy system to the new database.

The response post-implementation was not as positive as compared to pre-implementation as a result of the limited implementation actions. All the users’ expectations were not met and due to budget overrun, implementation actions were not available, which increased User Adoption constraints. The implementation actions which form a part of this category are consultation, user documentation, business process focus (BPF) (EP only), project control, customisation (EP only) and testing (EP only). Relevant quotes and text excerpts are highlighted in the sections below.

6.5.4.1 Consultation with users

Pre-implementation

A limited amount of time was used to plan for the business process re-engineering and the changes that would take place post-implementation. A user commented as follows: “...Where am I going to fit in, what more responsibility will be added to the new system? I would also like a brief description of what the new system will do and detail of the system” [ARC2, Respondent 2, DP].

User requirements were gathered pre-implementation: “... It all depends with the input of the new system and how I am going to be involved with it. At the moment they are not involving us.” [ARC2, Respondent 3, EP].

Post-implementation

It was clear that users were treated differently within different units of the organisation. Management did not communicate to all the users regarding the implementation that was scheduled to take place. “...because they did not really communicate with us here on the shop

floor ... This all happened there at the finance side ... So we were not informed about anything what was happening.” [Respondent 4, ARC 2, EP].

“The system is compatible for the job for the purchasing side. I know that for accounts purposes it will work perfectly, but in a manufacturing section of the company, running it through from purchasing material to material to the buyer to the typist and from the typist it comes back to the various departments. The department will authorise the material to be purchased and then it comes back to me, I control it from there as soon as the material gets in ... But the system itself has a lot of problems ...” [ARC 2, Respondent 1, EP]. The system met the requirements for the Accounting section of the organisation, but the users in the manufacturing side of the organisation did not feel that it catered for their business unit needs. Management did not identify the benefit of the system to the users and this increased User Adoption constraints.

6.5.4.2 User documentation

Pre-implementation

During the training session and prior to the implementation, users made the following comments regarding the user documentation which was not available to them: “To have a manual would be great. I know that people learn differently, but to have a manual ... something someone can refer back to on your own time.” [ARC1, Respondent 2, DP].

None of the users received any help files or user documentation prior to the implementation, and throughout the time the implementation took place, users did not have access to a help-desk because the reseller did not offer those services. The only support available was a consultant who was unreachable at times. There was a limited amount of support available to the users and this created confusion and frustration throughout the implementation.

There were similar findings during ARC2: “...There is no help section. There are no manuals on how to solve the problems we face.” [ARC2, Respondent 1, DP].

Post-implementation

Even though user documentation was provided to the users pre-implementation, the consultants continued to change the screens and workflow. A user commented as follows: “...They did not implement it into the manual yet. The manual is not what is actually how it is working.” [Respondent 4, ARC 2, EP].

6.5.4.3 Business process focus – post implementation only

No time was taken to plan the business processes post-implementation and the consultant did not inform the users of the process they would need to follow to complete their tasks. Prior to the implementation they could add a client on their legacy system without the need to get authorisation from another department. The users of the new system were dependent on the Accounts department to complete a transaction.

This resulted in a major change within their business unit. The Accounts department was situated in a different area of the building, which resulted in users having to physically leave their desks to ensure that their documentation would be approved before continuing with a transaction. Respondent 3, ARC 1 said the following: "...I ask myself the question every day whether this whole implementation of the entire system was evaluated properly, for our needs of our business unit..." A second user stated the following: "... And then I want to insert a field, they are going to say you need authorisation from Finance. Then I have to get up from my desk. Then I have to try and find someone from Finance to help me" [Respondent 4, ARC 1, EP].

Very little business process re-engineering was done to plan how the users and the business units would interact with one another post-implementation. "If you want to input a new client into the system, you have to get authorisation from admin, So if a client phones me and wants to buy a DVD, he wants it right away... and says he will pick it up." [Respondent 4, ARC 2, EP].

6.5.4.4 Customisation – post-implementation only

Pre-implementation user requirements were gathered to customise the user screens and to populate the drop-down list with the appropriate data needed within the organisation. During the training session, the customisation of the screens was not yet complete and this decreased confidence among users.

Post-implementation, the consultants were still customising the templates and users had great difficulty: "...They are making more and more changes." [Respondent 4, ARC 2, EP]. A second user stated the following: "...it needs to be more user-friendly." [Respondent 5, ARC 2, EP].

The interface created great concern among the users. A user said the following: "...and you have to scroll across the whole page just to see what is at the end of it to save it. It is just ludicrous, I'm sorry. The page is so huge you must move the toolbar to get to the other side of the page and you must move the toolbar down to get to the bottom of the page." [Respondent 3, ARC 1, EP]

6.5.4.5 Testing

Even though the users were satisfied with the amount of testing and time spent with the consultant prior to the implementation, they realised that more testing was needed post-implementation. One such user stated the following: "You can't always test it in a simulated environment" [Respondent 4, ARC 1, EP]. A second user had problems completing tasks and realised that more testing was needed, not only on the users' side, but to solve the technical problems which emerged. "They have to get things right through to the quote to the ERP to do their quotes and stuff." [Respondent 4, ARC 1, EP].

During the second ARC, users had limited time to test the system and most of the users felt that more testing should have been done: "... Trouble-shooting ... what would you like to do and then you go through it and now you know, OK, you can do this and you can do that." [Respondent 5, ARC 2, EP].

Many of the users were just given an overview of the system and no in-depth testing was done pre-implementation: "...We have not worked on it before; it is difficult for us to know it right from the start, but we need to get involved more and deeper into the program." [ARC2, Respondent 3, EP].

6.5.4.6 Project Control

Pre-implementation

The system went 'live' two weeks after the planned 'go-live' date, and as a result users could not remember the training that took place two weeks earlier. Accurate planning and incorporating users during the implementation process would have improved the control of the project and would have reduced User Adoption constraints.

It was clear post-implementation that there was limited or no project control compared to pre-implementation. The management of the host organisation and the consultants did not consider involving the users at this stage, since the financial constraints and budget overruns posed a greater threat to implementation failure. The budget which was planned pre-implementation was overrun and the amounts of time that it would take to fix the technical issues were unknown.

A user quoted the following "...if I think of the amount of money that has been spent on this new system... on getting consultants in to do training, flights and accommodation. They could possibly have investigated to upgrade to a newer version of our previous system where everyone is familiar, and that system would have probably done the same or maybe even more than this new system is doing." [Respondent 3, ARC 1, EP].

It was thus not feasible for the organisation to plan for any further training and it was clear that this posed a great threat for the users overall. At this point in time, a user had resigned and a second one was looking for other employment. It would have been appropriate for management to have encouraged users and to have taken a controlling role in the project at this point.

Post-implementation

There was no feedback mechanism in place post-implementation and a user stated the following: "They should ask all the people working on the system until now if there are any difficulties for you ... and work from that feedback and try to improve the thing with these people" [Respondent 4, ARC 2, EP]. Users also commented on the lack of planning during the implementation, with one stating "... because they do not have a set plan in training." [Respondent 4, ARC 2, EP].

6.5.5 Job Impact – Post-implementation only

The absence of a complete working system and the limited amount of access impacted the users' jobs negatively. The users realised that the new system required them to complete many more fields which resulted in far more clicks as compared to the previous system which they had been using. Job impact emerged post-implementation and is made up of the following concepts: speed

of task completion, and authorisation of the new system. Relevant quotations and text excerpts are highlighted below.

6.5.5.1 Speed of task completion

The new system resulted in many more steps to complete their tasks. The users found the system to be slower compared to the previous system. A user commented as follows: “Well, the problem is that my system is very slow...” [Respondent 4, ARC 2, EP].

6.5.5.2 Authorisation of the new system

Users did not receive the appropriate authorisation to complete their tasks and to work on the new system: “...You got authorisation to go into the system and close that file; currently I do not have authorisation to do that.” [Respondent 5, ARC 2, EP].

6.5.6 Resource Constraints – Post implementation only

Two concepts emerged from this category: these are technical and economic constraints. The sections below give text excerpts and descriptions of each.

6.5.6.1 Technical Constraints

Due to the old computer systems which the users were currently using and which was not compatible with the ERP system the users had various technical problems. A user stated the following: “She has had a lot of problems with her system crashing and freezing and so on.” [Respondent 5, ARC 2, EP].

Post-implementation, many users were not being assisted because of the budget overrun and the consultants were not available to assist them: “... I do have some issues that need to be sorted out with them, but that is not completed.” [Respondent 5, ARC 2, EP].

6.5.6.2 Economic Constraints

Users faced various problems due to lack of finances within the organisation. Users had outdated software and hardware on their computers. A user stated: “...The software is more modern than the actual hardware ... my laptop is now six years old...” [Respondent 4, ARC 1, EP]. One of the users did not have sufficient hardware on her computer to view the new ERP system (web interface) which increased User Adoption constraints.

6.5.7 Organisational Culture

According to Huang and Palvia (2001), the computer culture of the organisation refers to the company's history of computing, the employee's attitudes towards computing and the organisational dependence on computers. A company with a strong organisational culture will have better understanding of the application functionality and data management. Similar results were found during this study. One of the consequences of this was that users were not very open to sharing their knowledge within the organisation. One of the users commented as follows: “... But the culture within this workplace ... there is only five of us here but because of the selfishness

that we have here, one is too scared to find out what the other one is doing..."[ARC 2, Respondent 5, EP].

Findings during the second ARC indicated that as a result of the low computer literacy levels and poor education of the employees in the organisation, the users were fearful of losing their jobs. Consequently users did not communicate or share their knowledge with one another. This contradicts the observations made during the first implementation where users were more transparent and easily assisted fellow colleagues when necessary.

The organisational culture in this organisation influenced User Adoption during the second ARC (manufacturing firm). The researcher observed the users for a period of three months. It was clear that the lack of communication between management and users within the organisation increased adoption constraints. The users on the factory floor and management never communicated. Communication within the organisation was very low. A user stated the following regarding management support regarding the ERP issues: "... No, from my side I see issues just feel that they are useless in that, they do not support us... So he does not have a clue what is happening on the system for him it is just that the production must go on." [ARC 2, Respondent 4, EP].

The organisational culture and the relationships within the organisation impacted User Adoption negatively. A user commented: "...Although we are a part of the same chain he can't do my work and I can't do his" [ARC 2, Respondent 5, EP]. Even though users who worked closely together on the factory floor to ensure that the quality of the stock received was up to standard, were dependent on one another to complete their tasks, they did not know what the next employee's (fellow colleagues) responsibilities were or which part (screens) they should use on the ERP system.

6.5.8 Industry Sector

During this study, the researcher could identify the differences between the user constraints within the different industry sectors. This became evident during the second ARC.

It was evident that the IT maturity level in a manufacturing organisation was much lower than compared to that of the business services organisation. The educational level of the users and the kind of tasks they complete daily also impact User Adoption and the adaption process. Most of the tasks on the factory floor included physical work and stock control; not many of the users spent a long time at a computer. Consequently, their computer literacy skills were much lower within a manufacturing environment. Prior to the implementation, many of the users had never been exposed to a computer system and this was their first time on a computer. A user commented as follows: "...Yes, it improves the networking very much, because we never had computers before, but now we have computers and we can communicate with one another." [Respondent 5, ARC 2, EP].

6.6 Final Concepts – Properties and dimensions

Selective coding was the next coding stage that the researcher embarked on. Concepts were re-evaluated. Two new categories emerged: organisational culture and industry sector. Table 16 gives an overview of the final 23 concepts identified during this research, with the properties and dimensions of each concept.

Table 16: Final Categories and concepts - ARCs 1 & 2 (DP and EP)

Final Categories and Concepts – ARCs 1 & 2 (DP and EP)			
Category	Concept	Properties	Dimensions
Facilitating conditions	User communication	Communication method	{structured, unstructured}
	Hierarchical communication	Frequency	{high...low}
	Training quantity	Amount of training received	{large amount...small amount}
	Quality of training received	Quality of training – user perception	{good quality...low quality}
	System support	Support job completing	{high support...low support}
System expectation	User expectations	User expectations created	{positive...negative}
	Shared beliefs among users	Usefulness of the new system	{high degree of usefulness...low level of usefulness}
	Improved functionality	Increased functionality	{positive...negative}
System perceptions	Value of the new system	User's view of the new system	{valuable...not valuable}
	Workload and task completion	Amount of workload	{increase workload...decrease workload}
	Confidence among users	User's view of the new system	{uncertain...confident}
Implementation Actions	Consultation with users	Time spent with users	{large amount of time...limited amount of time}
	User documentation	Amount of user documentation provided	{large amount of user documentation...limited documentation}
	Business Process Focus	Planning BPR	{thorough planning of BRP...no BPR planning}
	Customisation	Degree of customisation	{high degree, low degree}
	Testing	Amount of testing	{large amount...limited amount}
	Project Control	Amount of control over users	{large amount of control...no control}
Job Impact	Speed of task completion	Speed of task completion	{improve...decrease}
	Authorisation of the new system	Level of authorisation	{high level...low level}
Resource constraints	Technical constraints	Amount of technical constraints	{large...small}
	Economic constraints	Amount of economic constraints	{large...small}
Industry Sector	Industry sector	IT maturity level of users	{high...low}
Organisational Culture	Culture	Relationships in the organisation	{positive...negative}

Table 17 gives totals of the categories and concepts identified during the diagnosing phase of both ARCs. Of the seven categories identified during this research, only five categories emerged during the diagnosing phases of this research. These are facilitating conditions, system expectations, system perceptions, implementation actions and one concept organisational culture.

Table 17: Diagnosing Phase Count ARC1 & ARC 2

Category	Concept	ARC 1 DP	ARC 2 DP	ARC DP Totals
Facilitating conditions	User communication (ARC1 DP)	11	0	11
	Hierarchical communication (ARC1 DP)	8	7	15
	Training quantity (ARC1 DP)	10	14	24
	System Support (ARC1 EP)	0	0	0
		29	21	50
System expectation	User expectation created by management(ARC1DP)	7	2	9
	Shared beliefs among users (ARC1 DP)	8	3	11
	Improved functionality (ARC1 DP)	10	8	18
		25	13	38
System perceptions	Value of the new system (ARC1 DP)	14	13	27
	Workload and task completion (ARC1 DP)	5	1	6
	Confidence among users (ARC1 DP)	10	11	21
		29	25	54
Implementation actions	Consultation with users (ARC1 DP)	12	8	20
	User documentation (ARC1 EP)	0	4	4
	Business process focus(ARC1 EP)	0	0	0
	Customisation (ARC1 EP)	0	0	0
	Testing (ARC1 EP)	0	0	0
	Project control (ARC1 DP)	4	0	4
		16	12	28
Job impact	Speed of task completion (ARC1 EP)	0	0	0
	Authorisation of the new system (ARC1 EP)	0	0	0
		0	0	0
Resource constraints	Technical constraints (ARC1 EP)	0	0	0
	Economic constraints (ARC1 EP)	0	0	0
		0	0	0
Industry sector	Industry sector	0	0	0
Organisational culture	Culture	0	2	2

Figure 15 below identifies the categories and concepts identified during diagnosing phase (ARC1 and ARC 2). One new concept emerged when compared to the first diagnosing phase 'user documentation.' Training quantity, improved functionality and value of the new system were also seen as important. The underlined concepts highlight those that the researcher felt were most important based on the observations made and feedback from users during ARC1 and ARC2. These include concepts that emerged from observations including considering the concept counts

during the diagnosing phases of the ARCs. User Communication (bolded) was still the most important facilitating condition during both ARCs, pre- and post-implementation.

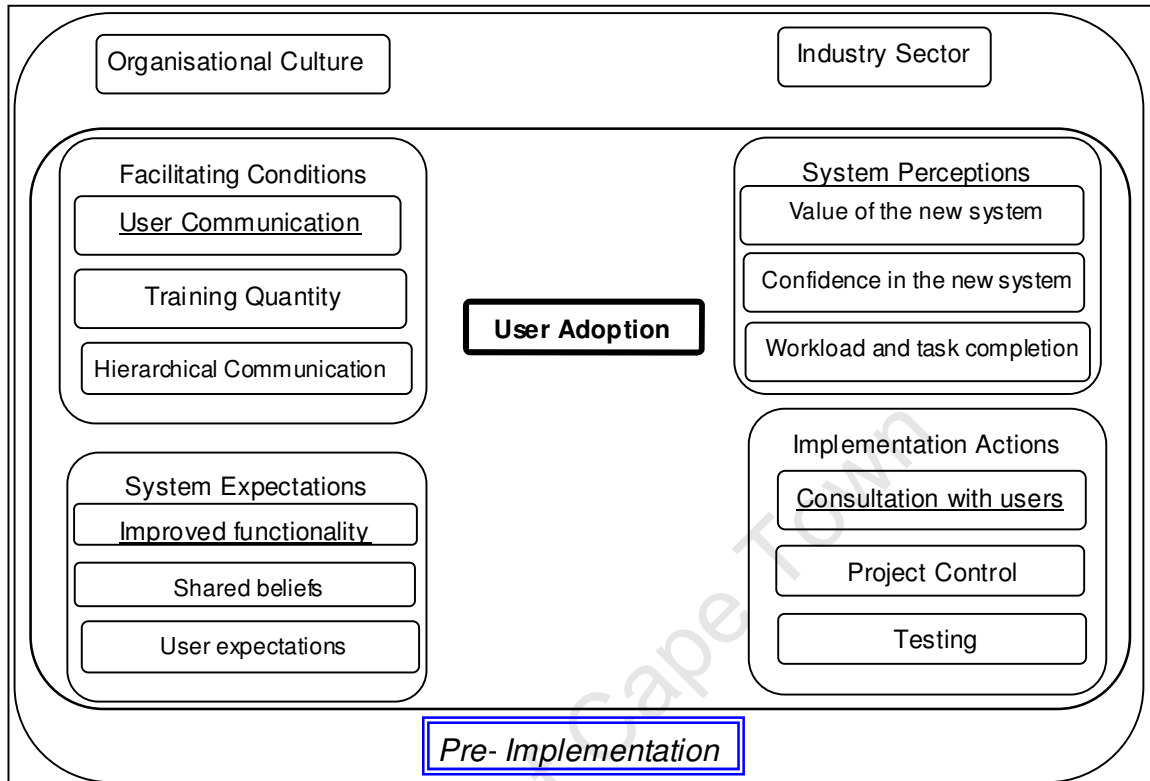


Figure 15: Open codes ARC 2 – Diagnosing Phases

Table 18 identifies the categories and concepts which emerged post-implementation (EP Phase). Two new categories emerged which were not present pre-implementation. These are job impact and resource constraints.

Table 18: Evaluating phase counts ARC 1 & ARC 2

Category	Concept	ARC 1 EP	ARC 2 EP	ARC EP Totals
Facilitating conditions	User communication (ARC1 DP)	2	4	6
	Hierarchical communication (ARC1 DP)	1	2	3
	Training quantity (ARC1 DP)	3	10	13
	System support (ARC1 EP)	10	7	17
		16	23	39
System expectation	User expectation created by management (ARC1DP)	6	1	7
	Shared beliefs among users (ARC1 DP)	2	1	3
	Improved functionality (ARC1 DP)	4	3	7
		12	5	17
System perceptions	Value of the new system (ARC1 DP)	15	1	16
	Workload and task completion (ARC1 DP)	0	1	1
	Confidence in the system (ARC1 DP)	3	1	4
		18	3	21
Implementation actions	Consultation with users (ARC1 DP)	4	4	8
	User documentation (ARC1 EP)	5	6	11
	Business Process Focus(ARC1 EP)	1	0	1
	Customisation (ARC1 EP)	6	2	8
	Testing (ARC1 EP)	1	3	4
	Project control (ARC1 DP)	5	0	5
		22	15	37
Job impact	Speed of task completing (ARC1 EP)	5	0	5
	Authorisation of the new system (ARC1 EP)	8	5	13
		13	5	18
Resource constraints	Technical constraints (ARC1 EP)	7	0	7
	Economic constraints (ARC1 EP)	2	0	2
		9	0	9
Industry sector	Industry sector	0	0	0
Organisational culture	Organisational culture - communication	0	6	6

Figure 16 depicts the open codes identified post-implementation during both evaluation phases; the prominent codes are underlined. The researcher selected these codes from observations and from considering the concept counts during the open coding process.

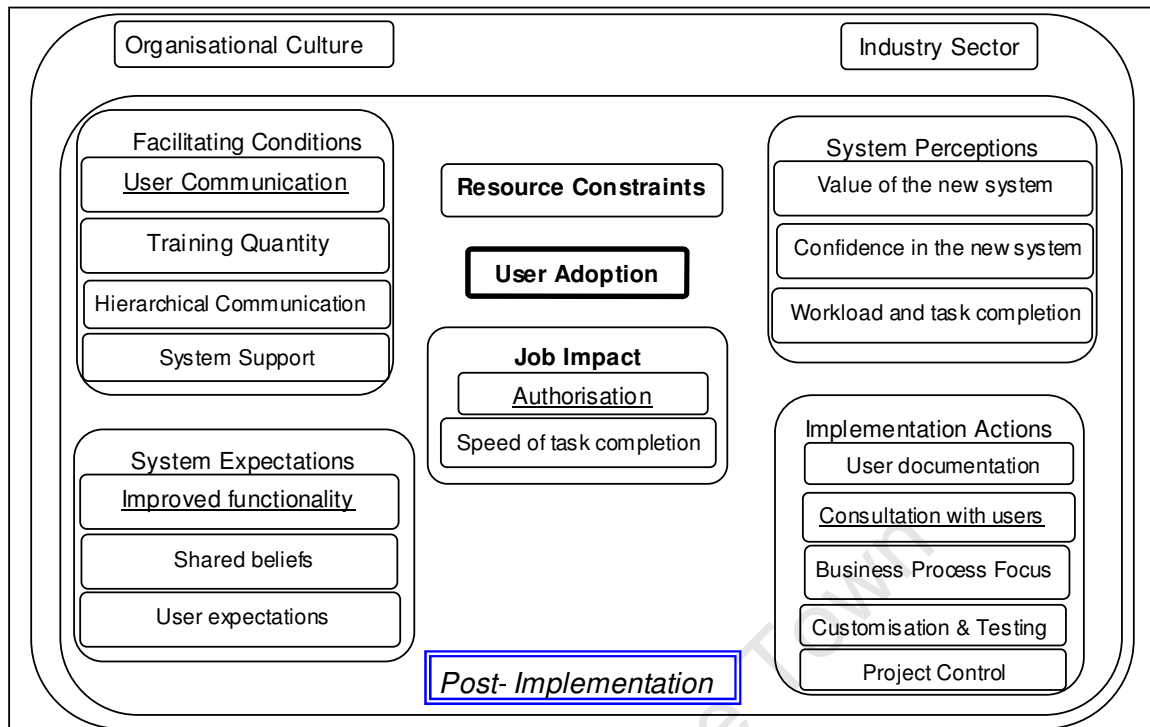


Figure 16: Open codes – ARC 2 – Evaluating phase

6.7 Axial Coding

This section describes the axial links between categories. Axial links are relevant because they illustrate the relationships between these categories. Axial coding provides a more detailed description of the phenomenon. The categories identified and links between these categories are described in the section below.

Sections 6.7.1 to 6.7.10 highlight links emanating between categories identified during the axial coding process. These links are grouped into categories, thus forming category pairs. For each pair, a mini storyline is provided, which describes and justifies the link. A table is provided in each section, which highlights the concepts that link these categories.

6.7.1 Link Resource Constraints to Facilitating Conditions – Post-Implementation

The ERP implementation was postponed due to a number of technical issues. The budget was overrun and as a result, user training received the lowest priority post-implementation.

All the users during the first ARC received a two-day group training session during which the database could not be accessed. As a result, the consultant demonstrated most of the system from her local computer, which resulted in users having limited or no hands-on training experience. Due to limited resource constraints, the planned implementation actions did not take place and user questions and concerns were neglected. Table 19 highlights the impact of resource constraints on training quantity faced post-implementation.

Table 19: Interview link from Resource Constraints to Facilitating Conditions

Concept	Interview Code & Ref	Description	Concept
Economic constraints (Category: Resource Constraints)	"Number one, our venue... It is a terrible venue to do training. We had a system that we could do training in, but we could not process orders, you know, it was very basic stuff. Umm... and it was like a two- day workshop, we ran out of time...." Ref: (ARC1, EP)	Due to limited resources, users did not receive the required training needed. This influenced user adoption constraints greatly, post-implementation.	Training Quantity (Category: Facilitating Conditions)

6.7.2 Link Facilitating Conditions to System Expectations– Pre-Implementation

In Table 20, a user highlights the expected benefit that the new system will have in their organisation but more importantly how the system will meet her individual need of working from home, which was not possible with the legacy system that was being replaced. During interviews conducted pre-implementation, the researcher realised the overall excitement among users regarding the new functionality and improved benefit for the users, which was mainly a result of user communication.

Table 20: Interview links from Facilitating Conditions to System Expectations

Concept	Interview Code & Ref	Description	Concept
User Communication (Category: Facilitating Condition)	"Yes, our manager mentioned that before that this is going to be web-based so when you have to work from home and your child is ill and you have to stay at home, you can still access information and do some work on the system. So that is a plus for me...Yes, and what I like about it, it is a web-based program so I can be in where ever and I can access it from an ADSL or a 3G, often we work from home and that is going to be great." Ref: (ARC1, DP)	Management communicating with users improved functionality and decreased user adoption constraints. However, unrealistic expectations will result in increased user adoption constraints.	Improved functionality (Category: System Expectation)

Although the new ERP package was a web-based solution, users would not have been able to conduct their tasks from home since they would need authorisation and interaction from the Accounts department to complete transactions within their specific business unit. This interaction

was not necessary on their previous legacy system since the new solution implemented would now interact with their accounting package, which previously was not possible. In this instance highlighted above, management created unrealistic expectations regarding the new functionality available on the new system.

Once the researcher returned to conduct a follow-up interview with this specific user quoted above post-implementation, the researcher was informed that the user resigned. This specific user was a part of the organisation for 11 years and resigned after the first day of training during which the user was exposed to the new system for the first time; it was evident that the user expectations were not met.

The researcher would like to highlight that realistic expectations created and communicated to users pre-implementation will decrease user adoption constraints significantly post-implementation. Accurate information and project control need to be in place regarding information communicated to users pre-implementation to decrease adoption constraints.

6.7.3 Link Implementation Actions to System Expectations – Post-implementation

During the follow-up interviews, users were very negative towards the system. They could not complete their daily tasks and they did not receive any support during this period since the consultant on-site could not assist them, either due to the large amount of errors which occurred on both sites (different locations) where the implementation took place. Lack of planning and poor Project Control contributed to the large amount of user adoption constraints post-implementation. The quote below indicates the frustration and distress among users to an extent that they were looking for alternative employment. Appropriate Project Control from management was needed to reassure users that the problems faced would be resolved and that the technical problems were only temporary. If this step was taken, users would have been less negative towards the new system. Table 21 presents the relevant text excerpt.

Table 21: Interview link from Implementation Actions to System Expectations

Concept	Interview Code & Ref	Description	Concept
Project Control (Category: Implementation Action)	"I will resign. I must go and look for another job, because I cannot work in the new system the way it is now." Ref: (ARC1, EP)	As a result of expectations not being met, users were very negative. Appropriate Project Control would have decreased user adoption constraints.	Improved functionality (Category: System Expectation)

6.7.4 Link Facilitating Conditions to System Expectations – Post-implementation

The reseller implementing the new ERP system could not resolve many of the issues post-implementation. The organisation and consultants had various meetings; during this time, users were stuck and did not receive any support. Since users realised that they could not be assisted because consultants could not resolve the issues, it created great concern among them and increased user adoption constraints. Table 22 presents the relevant text excerpt.

Table 22: Interview link from Facilitating Condition to System Expectation

Concept	Interview Code & Ref	Description	Concept
System Support (Category: Facilitating Condition)	"There are people going in and out here from the new system I do not know who they are what they are doing here, I do not know doing what? But nothing is being done with us, we are supposed to be working on the system but there is nobody helping us. I am just asking myself what is the point why did they go live if it is not ready." Ref: (ARC1, EP)	Users could not work on the new system and they had no communication with management post-implementation this created confusion and stress amongst users.	Shared beliefs among users (Category: System Expectation)

It would have been feasible to maintain control of the project during this time. Users and management, including consultants, should have kept communication in place and should have reassured users to remain calm. The lack of communication resulted in users making their own conclusions. Thus, users communicated with one another and were very negative about the new system. Shared beliefs among users increase user adoption significantly.

6.7.5 Link Implementation Actions to System Expectations – Pre-Implementation

User perceptions were positive pre-implementation as a result of consultation with users and communicating the improvement of the new system in the organisation. The text excerpt in Table 23 highlights how appropriate implementation actions create positive system expectations.

Table 23: Interview link from Implementation Action to System Expectation

Concept	Interview Code & Ref	Description	Concept
Consultation with users (Category: Implementation Actions)	"It is positive because we as the users of the previous system have been experiencing a lot of problems with it so I think. Yes, people are encouraging a new package because the old one has not been fulfilling our needs at all, not at all, but in some cases you know. Yes, data went missing and corrupted, whatever, so the users are seeing the plus of this all." Ref: (ARC1, DP)	Users' expectations were positive towards the new system since the previous system was outdated (in the organisation for 17 years) and they have been experiencing various problems with the old system. They perceived that the new system will eliminate these problems. Consultants communicated the benefits of the new system to the users and this created positive expectations.	Improved functionality (Category: System Expectations)

6.7.6 Link Facilitating Conditions to Implementation Actions – Pre-implementation

Sufficient facilitating conditions play an important role pre-implementation to ensure that users gain a good overview of the new system and to ensure that they have sufficient confidence in the system which will be implemented. The text excerpt below highlights the limited amount of training offered to users. During the first ARC, users received only a two-day group training session and as a result no individual training was made available to users. Similarly, technical constraints and limited space available resulted in users not being able to do all the testing and training necessary on the system. The text excerpt in Table 24 highlights the link from Facilitating Conditions to Implementation Actions.

Table 24: Interview link from Facilitating Conditions to Implementation Actions

Concept	Interview Code & Ref	Description	Concept
Training Quantity (Category: Facilitating Conditions)	"That were just basic things, and the rest will be covered in next week's training." Ref: (ARC1, DP)	Users' received limited time to test the new system and most users expected to receive proper view of the system during the next training sessions. Although this training session was never scheduled.	Testing (Category: Implementation Actions)

6.7.7 Link Implementation Actions to Job Impact – Post-Implementation

During both implementations, there was no planning pre-implementation to redesign the organisation's business processes. The new ERP solution forced the business to change their internal processes post-implementation. Users were not informed about these changes which took place post-implementation. This created confusion among users and as a result, their individual tasks could not be completed on a timely basis, which impacted their service delivery.

Consultation with users pre-implementation and the requirements gathered were not implemented in the new system. As a result, users were forced to manually type many terms, which were not displayed in drop-down boxes (the requirements gathered pre-implementation were added to the database). The text excerpt in Table 25 highlights the link from Implementation Actions to Job Impact.

Table 25: Interview link from Implementation actions to Job Impact

Concept	Interview Code & Ref	Description	Concept
Business Process Focus (Category: Implementation Actions)	"I mean our stock; we cannot do an order if there is no stock. Our business relies on us collating information from all over the world, and trying to sell it to a client. How can... if that stock is not on a system then we can't do a quotation. So now we have to go on Miscellaneous and type in, like yesterday type in 25 titles, because it is not in the system, physically type in the titles because it is not in the system, and it is such...Insert to move to the next line and move over and select miscellaneous it is ridiculous... I'm sorry...I wish they would just cancel the whole thing, honestly cancel it. Let me work on the old system. It's ridiculous." Ref: (ARC1, EP)	Lack of business process engineering resulted in a large number of user adoption constraints and impacted users negatively. They did not complete their tasks on a timely basis which resulted in poor service delivery.	Speed of task completion (Category: Job Impact)

6.7.8 Link Job Impact to System Perceptions – Post-implementation

Consultants could not resolve all of the technical issues prior to going live. There was no simulated environment to test all the functionality pre-implementation. This resulted in a large number of user adoption constraints post-implementation. Users could not complete all their tasks and did not have access to necessary information to complete their jobs. This resulted in

frustration among users and decreased their confidence in the new system. The text excerpt in Table 26 highlights the link from Job Impact to System Perceptions.

Table 26: Interview link from Job Impact to System Perceptions

Concept	Interview Code & Ref	Description	Concept
Authorisation of the new system (Category: Job Impact)	"Yes, it is impacting my Job. If the client is asking me for a quote, and I can't quote them that client is not in the financial system. I first have to now wait for someone else to create that client and give them a client number first I must say sorry client please wait while we still first sort out our internal problems here.."	Technical problems and limited authorisation in the system increased User Adoption constrains. As a result user confidence in the system decreased significantly.	Confidence in the system (Category: System Perceptions)

6.7.9 Link Resource Constraints to System Perceptions – Post-implementation

Due to the large amount of finance needed to implement the ERP package, the organisation did not plan to update users' computers prior to implementation with the new web-based ERP solution. Many of the users faced various technical constraints due to outdated laptops. These technical constraints gave the users negative system perceptions when in reality, with upgraded computers, these problems could have been overcome and users would have been able to view the system appropriately.

The text excerpt highlighted in Table 27 indicates the problems a user was facing due to a poor graphics card on her computer. Prior to the implementation, management discussed updating her computer but this was not done before the "go-live" date.

Table 27: Interview link from Resource Constraints to System Perceptions

Concept	Interview Code & Ref	Description	Concept
Technical constraints (Category: Resource Constraints)	"Terrible, terrible...I wish I could compare it to the program that we are working on now...No, and you have to scroll across the whole page just to see what is at the end of it to save it. It is just ludicrous, I'm sorry. The page is so huge you must move the toolbar to get to the other side of the page and you must move the toolbar down to get to the bottom of the page" Ref: (ARC1, EP)	Due to technical problems and outdated computers, users did not see the new system as valuable. This resulted in negative system perceptions.	Value of the new system (Category: System Perceptions)

6.7.10 Link Organisational Culture to Facilitating Conditions - Post-Implementation

The culture within an organisation affects User adoption of a new system. Organisations that lack communication among employees will increase User Adoption constraints. During the second ARC, users did not often communicate with fellow co-workers. Many of the employees in the organisation have been a part of the organisation for more than ten years.

Most of the users did not have any formal education and no computer skills. This made it difficult to assign a super user within a department because users would not share information or assist other users because of fear of losing their jobs. The text excerpts in Table 28 highlight the difficulties users faced because of poor communication within the organisation.

Table 28: Interview link from Organisational Culture to Facilitating Conditions

Concept	Interview Code & Ref	Description	Concept
Culture (Category: Organisational Culture)	<p>"But the culture within this workplace is even though it is only five of us here. Because of the selfishness that we have here, one is too scared to find out what the other one is doing. To me it would be great to know what he is doing and what I am doing.... That is why we are sitting with five pensioners sitting here. The company says that it is critical skills. It is critical because we have nobody who is shadowing you, passing it on me? "</p> <p>Ref: (ARC 2, DP)</p>	Lack of communication and information sharing within an organisation increased user adoption constraints. This is as a result of the organisational culture in the organisation.	User communication (Category: Facilitating Conditions)

6.7.11 Conclusion

Through several iterations of the data, and analysis of the data using open coding, axial coding and selective coding, a final research model was derived. This model is presented in Chapter 7.

7. Research Findings

The aim of this chapter is to interpret the findings obtained through the application of Grounded Theory techniques, in light of the research questions. Conditions and experiences unique to medium-sized organisations within an emergent economy are also shared, and comparisons are made with findings from the literature. Section 7.1 presents the final research model, and Section 7.2 discusses the factors affecting ERP User Adoption in SMMEs in emerging economies. The Chapter concludes with a summary of research findings in Section 7.3.

7.1 Final Research Model

The process of theory formulation is an essential part of AR (Baskerville & Pries-Heje, 1999). This research project demonstrates how units of analysis and techniques from grounded theory can be integrated into ARCs to add rigour and reliability to the theory formulation process. This section presents the findings from the two research cycles which took place over a period of five months during this research project. Data was collected during four intervals - the Diagnosis and Evaluation Phases of ARC1 and ARC2. Through several iterations of the data, the final research model was derived, and is shown in Figure 17.

University of Cape Town

ERP User Adoption Model for SMMEs : In Emerging Economies

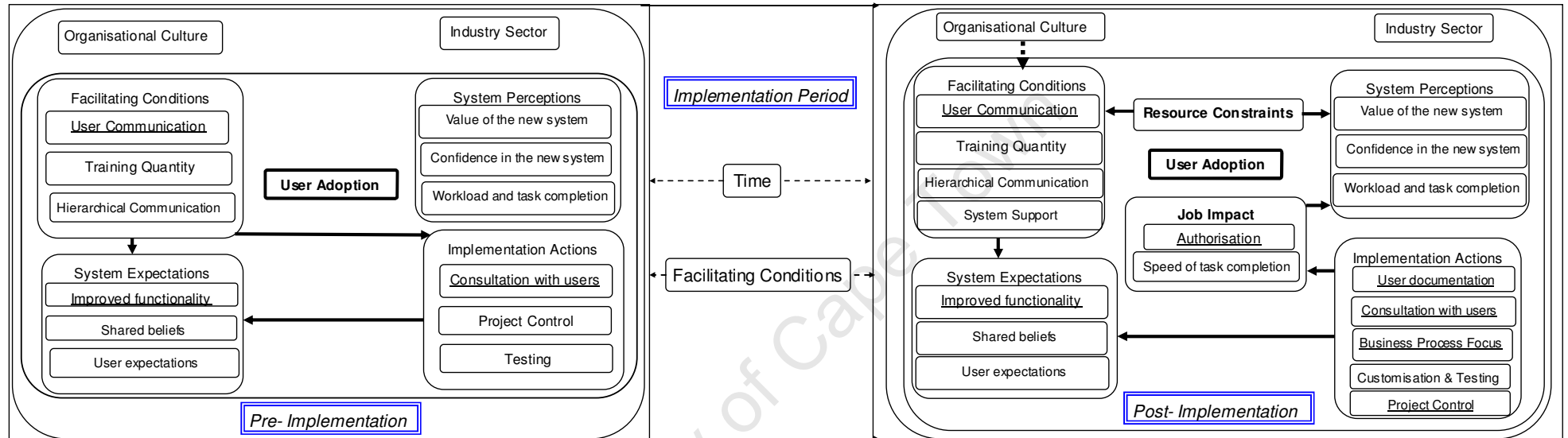


Figure 17: Final research model

7.2 Factors affecting ERP User Adoption in SMMEs in emerging economies

This section highlights the User Adoption constraints identified during both ARCs and compares these findings with previous research.

This study revealed that numerous issues are encountered while implementing an ERP system in an SMME. Some of these issues are similar to those reported in previous adoption studies, while others differ.

SMEs perceive an ERP solution as a way to integrate their internal business processes and not necessarily to integrate with external partners (Tagliavini et al., 2005). Findings during their study identified that management issues in complex organisations will decrease once an ERP system is implemented within the organisation. Results during this research differed, during ARC2, users moved away from a manual system, which has been a part of the organisation for 30 years. Once the new ERP system was implemented, users kept the manual system in place even though they were using the ERP software. During year-end and stock-take, users went back to the manual system to compile reports and did not refer to the ERP software reports. It was clear that users did not have confidence in the new software or the information provided.

According to Laukkanen et al. (2007), significant weaknesses exist between SMMEs and large organisations regarding the objectives and constraints in ERP system adoption. In line with the literature, similar results were found during this research study: findings showed that there is a lack of business process focus and user documentation and project control within SMMEs.

During both ARCs, the researcher observed that the lack of procedures and structure within organisations resulted in increased user adoption constraints. During the first ARC, no procedures were in place post-implementation as a reference for users using the system. As a result, users faced additional constraints due to not being aware of how to authorise transactions and who the responsible person assigned to do these tasks was. The researcher designed user adoption diagrams during the second ARC. These diagrams identified the roles the users have within the organisation and the tasks which they need to complete post-implementation.

During the second ARC, there were limited procedures and a lack of structure in place throughout the organisation. For instance, it was found that users in the Accounts department often made double payments to suppliers. This would occur even before the goods were received and before a Goods Received Note (GRN) was issued within the organisation and captured on the ERP system. This resulted in complications within the Accounts department, supplier accounts were often out of balance, and the amount of stock within the system did not correspond with payments made and receipts within the organisation. The researcher observed that stock was received on the system, but when stock failed to go through the quality control process on the factory floor, it would be sent back to suppliers, but this would not be corrected on the ERP system.

Furthermore, users would correct mistakes made on the invoice and GRNs with a pen, but would never correct this on the ERP system. Due to the lack of procedures, structure and communication within the organisation, management only realised the errors during month-end and stock-takes. Sections 7.2.1 to 7.2.7 describe the main categories identified during this research compared to previous research.

7.2.1 Facilitating Conditions

User communication and hierarchical communication

Project communication on the benefit of the system appeared to create initial excitement among users (Seymour & Roode, 2008). Similar results were found during this research. It was clear that overall, users were very positive prior to the implementation. However communication with users was not maintained throughout the implementation (ARC 1 and ARC 2). Towards the end of the implementation, users did not receive any communication about the technical problems, which they were facing, and this created frustration among users.

Training and system support

The lack of training during an implementation will increase frustration among users (Seymour & Roode, 2008). During this implementation (ARC2), the project plan and budget allowed for a two-day training session. At the time the training took place, the project budget was overrun and did not allow for any further consultation with the users. This resulted in frustration among users. The users felt that the training provided was not sufficient to meet their needs.

Previous research in SMEs indicates that users prefer a hand-holding approach even after they have received substantial training (Upadhyay & Dan, 2009). Similar results were found during the second ARC. Users with lower levels of literacy needed individual training and in many cases, elderly users did not have the confidence to ask questions during group sessions.

While organisations all hope to reap the benefits of ERP systems, they must first understand the impact that the implementation will have on their employees (Chang et al., 2008). Besides training, users need to be encouraged that the difficulties they face pre-implementation will decrease once they adapt to the new software and all the technical problems are solved. The researcher realised that many of the problems identified by the users were not managed properly due to lack of communication and not providing feedback to the users once the problems were resolved. Effectively communicating with users and providing sufficient support will aid user adoption. During this research many of the problems faced by users could have been prevented if management and consultants encouraged users throughout the implementation.

7.2.2 System Expectations

Expectation, functionality and belief

According to Calisir and Calisir (2004), system capabilities have a strong impact on perceived usefulness of ERP systems. ERP system designers should pay more attention to user requirements analysis to determine their expectations and requirements for the content of the

ERP system. Similar results were found during this research project. The following factors affected system expectations among users; these include user expectations created by management, shared beliefs among users and functionality of the new system. Most of the respondents were very positive and excited to use the new system. They were ready to move to a new system because the legacy system did not integrate with the rest of the applications within the organisation. These system expectations were not met post-implementation, which increased user adoption constraints, resulting in users resigning from the organisation.

7.2.3 System Perceptions

Value, confidence and workload

Users and management do not share the same view of an ERP implementation. Because of the hierarchy in an organisation, management and users do not agree on the usefulness of a system (Lim, Pan, & Tan 2005). In line with these findings, users during ARC 1 experienced higher workloads because more input was required on the new system. This resulted in frustration among users but in retrospect, the new information captured would provide management with more information to draw accurate reports and will improve decision-making within the organisation.

The different roles users have within the organisation and their hierarchy influenced the way they viewed the system and its usefulness. During the diagnosing phase, all users were very positive and excited, but this clearly changed post-implementation. Users that were completely dependent on the new system seemed to be less positive post-implementation compared to those that were only partially dependent on the system to complete their tasks.

Seymour & Roode (2008) argued that the impact of an ERP implementation on a job is a personalised response. The Accounting department employees had much more control over the system and as a result, users were much more satisfied. Other departments were forced to change their internal business processes to fit in with the rest of the solution presented in the organisation.

7.2.4 Implementation Actions

Consultation, testing and customisation

Strategies to increase “user participation” were identified as key from the adoption stage onwards and decreased organisational risk. Talking to end users and understanding their expectations is a means for organisations to minimise user dissatisfaction and poor system quality (Paba-Nzaou, Raymond, & Fabi, 2008). During this research, users received a limited amount of time with the consultant to discuss customisation during both ARCs. According to Yusuf, Gunasekaran and Abthorpe (2004), system testing and getting the users to accept the system are important roles which need to be in place during the pilot phase of an implementation. Findings during this research proved that the lack of testing pre-implementation resulted in frustration among users and created a large number of user adoption constraints post-implementation.

Business Process Focus

The users of the new system were dependant on the Accounts department to complete a transaction. Process management is defined as a set of concepts and practices aimed at better stewardship of business processes (Motwani, Mirchandani, Madan, & Gunasekaran, 2002). It was clear that no time was taken to plan the business processes post-implementation and the consultant did not inform the users of the process they would need to follow to complete their tasks. This created confusion among users. Prior to the implementation they could add a client without the need to get authorisation from anyone else.

User documentation

According to Kennerley and Neely (2001), lack of training, documentation and user support could result in increased user constraints. None of the users received any help files or user documentation prior to the implementation. At the time the implementation took place, users did not have access to a help-desk because the reseller did not offer those services. During the second ARC, users were provided with user documentation to assist users and decrease adoption constraints. Users saw the benefit of the manuals, but as a result of low education within the manufacturing firm, users required additional computer literacy skills prior to using the ERP software but this was not available to them and out of the scope of the project.

Project control

Noudoostbeni et al. (2009) stated that poor planning and management increases user resistance. This was similar in the implementations which took place. The ERP system (ARC 1) went “live” two weeks after the planned “go-live” date, and as a result users could not remember the training that had taken place two weeks earlier. Accurate planning incorporating users during this period would improve the control of the system and decrease the user adoption constraints.

7.2.5 Job Impact

Speed and authorisation

Seymour & Roode (2008) stated that job impact influences a user’s system perception. During this case study system perception among users varied during different stages of the implementation. Users from different business units viewed the system differently. This was as a result of the dependency of task completion and how this impacts their jobs.

Increased attention should be paid to authority levels given to users of the system. Too much control will streamline operations but will make the organisation less flexible. Too little control will cause potentially harmful drift in the organisation (Ignatiadis & Nandhakumar, 2006). Similar results were found during this research. During ARC 2, users experienced a large amount of user adoption constraint because of limited access provided on the system which resulted in users not being able to complete their tasks.

7.2.6 Resource Constraints

Economic constraints

During planning, prior to implementation, various problems were identified which could lead to user adoption constraints. These included current resource constraints within the organisation regarding the state of the computers. The new software (ERP package) did not seem compatible with the hardware capacity of the users' current computers and the organisation did not plan to replace these computers prior to the implementation. On average, the computers have been used in the organisation for an average of 6 years and normal applications such as Microsoft Word and Excel were not stable on the users' computers. According to Laukkanen et al. (2007), due to resource poverty the adoption of ERP holds a greater risk to SMMEs. Similar results were found during this research and inappropriate hardware resulted in server and integration problems.

Huang & Palvia (2001) compared ERP implementations between developed and developing countries. This research identified a developing economy framework, which included economic, cultural and basic infrastructure issues as barriers to adoption. Findings during this study proved that low IT maturity, small firm size and lack of process management and BPR hamper ERP adoption. Many of the respondents commented on the lack of resources in their respective organisations. They felt that the new implementation did not happen at the correct time. A second problem identified was regarding the conversion from the legacy system to the new system as this created anxiety among the users. It seemed problematic because of the large amount of data which had to be re-entered into the new system. A one-week parallel conversion did not provide the users with enough time to recapture the information which they needed.

Technical constraints

Many of the problems faced during implementations are related to the large technical challenge of rolling out the enterprise system (Davenport, 1998). However, technical challenges are not the main reason why implementations fail. During this study, findings revealed that various user adoption constraints and lack of updated computer systems contributed to a large amount of user adoption constraints. Findings indicate that SMEs are more vulnerable to technological and organisational factors and less vulnerable to environmental factors than compared to large organisations (Ramdani, Kawalek & Lorenzo, 2009). Due to the large amount of technical issues, users could not test the new ERP system during the training sessions and users did not receive the necessary authorisation needed to complete their tasks. Technical constraints had a huge impact on user adoption constraints.

7.2.7 External Constraints

Industry sector

Findings indicate that users from different industry sectors faced different user constraints. According to Seymour & Roode (2008), even though training was given to users, the way training was conducted affected their response to the system. During the second ARC, users received significantly more training when compared to the users in the first ARC (both organisations

implemented the same software package). Feedback indicated that due to the low literacy levels in within the organisation, users should have received basic computer training prior to the ERP training given. Users with individual needs should also be addressed separately.

During this study, the researcher could identify the differences between the user constraints within the different industry sectors. This became evident during the second ARC. During the first ARC, users could freely speak to the manager of the unit to discuss issues regarding the implementation. During the second ARC, users did not speak to top management regarding the implementation. Various issues went directly to the ERP reseller and in many cases management never realised what the users went through. This was mainly due to the organisational culture and the differences in the groups within the organisation.

Huang and Palvia (2001) highlighted that a low level of IT maturity increases user adoption in an organisation. Similar results were found during this research. The overall comment of Users on the documentation and manuals was that the manuals were too complicated and that the training should have been slowed down. Users on the factory floor asked for documentation on basic navigation within Windows. It is clear that users in the manufacturing industry sector have much lower levels of education and have been a part of the organisation long before they had access to computers. It was clear to the researcher that these users faced much more user adoption constraints when compared to users in the business services industry sector where those users had much higher computer literacy levels.

Table 30 presents an overview of the literacy levels within the manufacturing and business services industry sector in South Africa. It is clear that more than 50 percent of the employees have no qualification above Grade 12. These statistics emphasise that complex computer systems will be difficult to use when users have low literacy levels especially in South Africa which has lower levels of education when compared to developed economies.

Table 29: Industry sector and education level (Statistics South Africa, 2011)

South Africa	Grade 0-8	Grade 9-11	Grade 12	Less than Grade 12	Degree
Manufacturing	13.57 %	23.47 %	47.46 %	10.14 %	5.35 %
Business services	6.84 %	18.25 %	53.42 %	6.84 %	8.34 %

Organisational Culture

According to Huang and Palvia (2001), the computer culture of the organisation refers to the company's history of computing, the employee's attitudes towards computing and the organisational dependence on computers. A company with a strong culture will have better understanding of the application functionality and data management. Similar results were found during this study.

ERP system implementations in a global environment can be problematic due to different country cultures and the internal enterprise culture. When a Western-developed ERP system is implemented in an emerging economy where the culture differs from that of the developer, the implementation may require localisation which includes customisation of tax and accounting standards, in order to be successful (Srivastava & Gips, 2009). Evidence during this research proved that internal enterprise cultures play a big part in user adoption. Users often commented on the sectionalisation within the organisation. Users in the Administration department had much more access to information and communication with top management, than compared to users on the manufacturing floor. The users on the shop floor had little or no communication with management and did not have the confidence to speak to managers openly because of the organisational culture within the organisation.

An ERP system's strategic value can be restricted due to cultural barriers (Srivastava & Gips, 2009). One of the consequences of this was that users were not very open to sharing their knowledge with other users within the organisation. Prior to the ERP implementation, the researcher and the consultant decided to select a super-user to train the other users within the organisation. The selected user had been a part of the organisation for 31 years and it seemed appropriate to select a user who was very familiar with the business. Once the user training started, the consultant and the researcher realised that specific users could not cope with the large capacity of information on the new ERP system.

Findings during the second implementation indicated that because of the low computer literacy levels in the organisation, users were fearful of losing their jobs. Consequently, users did not communicate or share their knowledge as much with other users. This contradicts the observations made during the first implementation where users were more transparent and easily assisted fellow colleagues, which improved user adoption during the implementation process.

7.3 Summary of research findings

This Chapter highlighted the findings of both ARCs. Many of the findings are similar to the literature while others differ. The research model in this Chapter depicts the User Adoption constraints identified both pre- and post-implementation. The main findings include illustrating that User Adoption constraints are dynamic and need to be facilitated accordingly at different intervals during an ERP implementation.

8. Conclusion

This research has supplemented previous user adoption studies with the hope of increasing understanding of user adoption of ERP systems in SMMEs, in emerging economies.

This research had three main objectives. Firstly, to identify user adoption constraints faced by SMMEs during the adoption of an ERP system. Secondly, to develop a User Adoption model that would be useful to SMMEs during the adoption of an ERP system; and lastly to assist SMMEs during an ERP implementation. This study achieved these objectives, using mixed grounded methods and canonical action research and generating a model to assist user adoption in SMMEs in emerging economies. The resultant user adoption model used to improve ERP user adoption and to facilitate changes that took place during an ERP implementation within SMMEs has been presented. Conditions and experiences unique to medium-sized organisations within an emergent economy have also been shared.

8.1 Research outcome

At the start of the research the following research questions were investigated:

- What adoption constraints do users face during an ERP implementation, in emerging economies?
- How can users be facilitated during an ERP implementation?
- What can influence the users' system perceptions?

During the second ARC, the research questions were modified to supplement the findings of the first ARC and to identify the specific constraints users faced before and after an ERP implementation. The questions were thus:

- What adoption constraints do users face before, during and after an ERP implementation, in emerging economies?
- How can users be facilitated during an ERP implementation?
- What can influence the users' system perceptions?
- How do user adoption constraints differ within different industry sectors?

8.1.1 Research Problem

Information systems implementations are costly and relatively unsuccessful. A limited amount of research addresses end-users' acceptance of ERP systems (Legris et al., 2003). The way ERP systems are perceived, treated and integrated within a business plays a critical role in the successful adoption of the system. Yet a new ERP system is seen as a burden to first-time users, and research has proven that social factors determine the successful usage of an ERP system. Similar problems were identified during both ARCs pre-implementation and post-implementation.

8.1.2 Solutions

The primary research question was answered through presenting a model, which identifies user adoption constraints pre- and post-implementation. This model identified that user adoption constraints are dynamic during an implementation and different facilitating conditions and implementation actions should support these user constraints during different periods of an implementation. For instance, Resource Constraints affect User Adoption toward the end of an implementation and not at the start of an implementation.

To answer the second research question, two ARCs were conducted. Research Actions included user documentation and user diagrams that aimed to support users as part of this research and to improve user adoption of an ERP system.

To answer the third research question, system perceptions can be influenced by users perceiving the system as valuable or not, the workload and amount of tasks users need to complete, and the confidence other users (employees) have in the new system.

Lastly, organisational culture and the industry sector impact user adoption constraints. For instance, users in the manufacturing industry sector have much lower levels of education compared to the business services industry sector and thus face additional user adoption constraints.

8.1.3 Key Findings

User adoption needs to be addressed in order for ERP implementations to be more successful. Resellers should realise that if an ERP system is only technically successful and integrated within an organisation it does not necessarily mean that the entire ERP project will be a success. User satisfaction plays a more important crucial role in the successful adoption of an ERP system within an organisation.

The outcome of this research is a model of categories and the relationships between them. The theory aims at supporting and enriching the existing body of knowledge on ERP implementations in emerging economies, more particularly for SMMEs in a South African context. The model identifies factors which influence user adoption constraints pre- and post-implementation.

Factors which influence User adoption constraints identified pre-implementation include Facilitating Conditions, Implementation Actions, System Expectations and System Perceptions. Additional factors identified post-implementation, which did not play a role pre-implementation, are Job Impact and Resource Constraints. Appropriate Facilitating Conditions were seen to be important throughout the implementations and this should be considered throughout.

External factors which influence User Adoption constraints include the Organisational Culture of the organisation and the Industry Sector. The most important user adoption constraint identified and which is highlighted in the resultant model is "User Communication". The Organisational Culture of the organisation influences the communication within an organisation and the way people interact and share information regarding the implementation.

8.1.4 Research Limitations

Various limitations were encountered during both research cycles. The researcher could only gain access to the project one week prior to the implementation taking place (ARC 1). As a result, it was very difficult to plan and contribute to the project with only a single week's time span. Consequently the researcher could not contribute towards the project as much as would have been possible if the researcher joined the project at an earlier stage. User adoption constraints faced during the first research cycle were not solved and if the researcher was able to provide user documentation and training manuals these constraints could have been reduced.

The researcher had limited control over the actions taken during the implementation. Towards the end of the project, the researcher wanted to assist with further training, but due to the nature of the contract that the ERP reseller had with their client, further access to the premises was not possible. The budget and the number of hours detailed in the contract with the host organisation were fixed. The manuals and diagrams completed during this research were presented to the users. Due to the cost of printing the manuals, not all the users could have access to individual manuals and as a result some of the users were forced to share training material. If the researcher was able to provide additional training to the users, these constraints could have been reduced.

8.1.5 Generalisability of findings

This research study attempts to provide experiences on ERP implementations in emerging economies. The researcher studied two case studies (ERP implementations) both implementing the same ERP package in South Africa. These case studies took place in different industry sectors, which are business services and manufacturing. This research while in the SMME space was performed in two medium sized organisations and hence could only be generalised to medium sized organisation.

The findings of this research are both of practical and theoretical importance. This research is a starting point to emphasise the large amount of User Adoption constraints faced by users during ERP implementations in emerging economies. These research findings are important to SMMEs in a country such as South Africa and other emerging economies. The research findings would assist practitioners (ERP resellers) to facilitate User Adoption in SMMEs both pre- and post-implementation. A similar study examining this subject in an even broader sample of organisations in other countries could further serve to extend the research findings.

8.2 Implications for further research

This study has focused on ERP user adoption within medium-sized organisations in an emerging economy. This has been a longitudinal study over a period of four months. A research model has been presented. The aim of AR was to contribute to both theory and practical concerns regarding ERP implementations in emerging economies.

ERP implementation and user adoption need to be managed to ensure the success of these implementations. It is hoped that this model presented will be able to assist other ERP

implementations in SMMEs within emerging economies in ensuring the success of these implementations. Future research could validate this model in other industry sectors.

8.3 Acknowledgements

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Appendix A: Semi-Structured interview questions

Semi-structured Interview: Question sheet	
These questions posed in the interview may vary depending on the information received and other new concepts that may arise.	
General questions:	
1.	What is your name and position in the organisation?
2.	What is your educational background?
3.	How long have you been working in the organisation?
Communication:	
1.	To what extent were you well informed about the ERP project before the implementation? (when and by whom) (C1)
2.	How were you informed of the new system? (newsletter, meeting, manager).(C2)
3.	Do you have any suggestions on how the communication could have been improved? (C3)
Facilitating conditions:	
1.	What are your views on the training you received before the implementation? (time, duration and by whom).(F1)
2.	Did the training improve your understanding of the new system, and how? (F2)
3.	In what way did the training give you confidence to use the new system? (better understanding of the functionality available).(F3)
4.	To what extent did you feel that the documentation provided was useful and sufficient? (F4)
5.	How do you feel that the documentation provided could have been improved? (F5)
6.	How did the management support you during the implementation, and how could their support have been improved? (F6)
7.	To what extent did the help desk assist you? (F7)
8.	How did your colleagues assist you during the implementation? (F8)
9.	Who helped you, and how did each individual help you? (F9)
Job impact:	
1.	How does the new system impact your workload? (In what way?).(J1)
2.	How do you feel about the timing given to you to adjust to the system? (If no, what time period would have been more appropriate?).(J2)
3.	What impact will the new system have on your job performance? Will it increase your efficiency? (What is the current impact on your job performance? What will be the long term impact?).(J3)
4.	In what way will the new system improve your networking with the other employees? (J4)
5.	Do you feel that the new system is meaningful and valuable to your job? Does it increase your job performance? (J5)
6.	Have you been provided with sufficient authorisation and access to all the information needed to complete your job? (J6)
7.	Do you feel that you can complete the tasks assigned to you faster, now that the new system is available? (J7)
Overall impact of the implementation:	
1.	Were you given the opportunity to provide input into the planning process before the implementation took place? <ul style="list-style-type: none"> • What input did you provide? • How was your input applied? (I1)
2.	What communication took place before the implementation? <ul style="list-style-type: none"> • Was the top management clear on the implementation process, timeline, and training? • What communication took place before the implementation? (I2)
3.	Were you provided with the opportunity to test the new system? (Please explain, the time frame given to you?).(I3)
System perceptions:	
1.	Will it be more sufficient to work with the new system in place, and why? (S1)
2.	Do you find the interface user friendly and easy to understand? (S2)
3.	Do you find that the new system increases your job performance and productivity, and in what way? (S3)
4.	How is the new system useful to your job? Is it efficient? (S4)

5.	How do you think the new system will benefit your organisation overall? (S5)
6.	How do your colleagues find the new system? (S6)
7.	Do you think the new system is a better solution compared to the old solution? (S7)
8.	Do you feel that the new system provides you with more information, and to what extent? (S8)
Concluding Questions:	
1.	Do you have any recommendations of how the training could have been improved?
2.	Do you have any other questions or comments?

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Appendix B: Overview of ERP products for SMMEs

1. ERP vendors

Many would analyse small and medium ERP processes as less complex compared to large ERP systems. Gartner has produced research that analyses mid-market ERP as a unique process framework, and that medium-sized enterprises have a core set of business processes that are more complex than those of large enterprises (Hestermann et al., 2009).

Large ERP vendors are now developing lower cost solutions for smaller businesses. As a result there has been an increase in the number of products available to SMMEs and some products are much more proven than others. SMMEs should engage in a vendor selection process that ensures they choose the ERP package that meets the needs of their specific organisation (Kimberling, 2009). The mid-market ERP space is fragmented, but the vendors which focus specifically on specific industries are often narrowed to a small selection (Hestermann et al., 2009). This section outlines the market leaders and ERP products available to SMMEs.

SAP portfolio and products

SAP South Africa states that sub-Saharan countries account for only 1 percent of global revenue. SAP currently has a 65 percent market share in the core ERP market in South Africa (Mawson, 2009). 'SAP Business All-in-One' is rated as a visionary in the mid-market space and is voted as one of the broadest and deepest solutions in the market (Hestermann et al., 2009). The two products which cater for the SME space include 'SAP All-in-One' and 'SAP Business One'. Table 1 presents an overview of SAP products.

Table 1: SAP Mid-market product evaluation (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. Of Employees)
SAP: Business All-in-One	Best suited for mid-sized organisations with all industries.	More than 1000 employees
SAP: Business One	A single integrated solution.	Small organisations

Two-thirds of SAP's customers in Africa are SMEs (Parker, 2009). SAP Business All-in-One has various advantages including support to many users which is well suited for fast-growing companies in the upper mid-market. SAP has a strong partner strategy which offers users a wide range of partners in many countries. SAP has a rich domain experience which targets vertical markets and many sub-sector solutions are offered by globally diverse partners (Hestermann et al., 2009). SAP Business All-in-One has the following three weaknesses. Firstly, this solution is more complex and expensive compared to other mid-market products. Secondly, SAP administrative costs are very high, and lastly, many customers prefer only to use SAP as part of

their core business and other mid-market products in their plant level operations (Hestermann et al., 2009).

Oracle portfolio and products

Oracle's enterprise-class business products and solutions cater for small, medium-sized and enterprise-level organisations. Oracle which was founded in 1974 remains a major player for database technology and applications in enterprises (Business Software, 2009). Oracle's enterprise solutions which cater for the mid-market space include Oracle E-Business Suite and JD Edwards Enterprise One. Table 2 gives an overview of the Oracle Business products currently on the market available in the SMME space.

Table 2: Oracle Mid-market product evaluation (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. Of Employees)
Oracle: JD-Edwards 9.0	Oracle JD Edwards Enterprise One is a broad solution that was originally built on IBM technology but available today on a variety of platforms.	Small and medium sized organisations
Oracle: E-Business Suite 12.1	EBS has strong manufacturing functionality for the high-technology industrial, manufacturing, automotive, life sciences, consumer packaged goods, chemical, and aerospace and defence industries.	Medium sized organisations

Oracle JD-Edwards has the following strengths: Firstly, this application supports a wide range of industry functionality which is supported in the core system. Secondly, it is moving towards embedded analytics and JD-Edwards has a strong market presence in many countries (Hestermann et al., 2009).

Oracle JD-Edwards has the following weaknesses: Firstly, Enterprise One offers no vision for open standards-based, service-oriented or model-driven packaged application suite. Secondly, there is a lack of deeply integrated Microsoft technology which poses problems for companies with a Microsoft middleware strategy. Lastly, there is a lack of consultants specifically with Oracle's entry into the mid-market in certain regions (Hestermann et al., 2009).

Oracle E-Business Suite (EBS) has the following strengths: Firstly, EBS is available across a wide number of industries and is scalable in terms of users, which make it well suited for mid-market companies that are expected to grow fast to upper mid-market companies. Secondly, it allows for fast deployments and offers comprehensive deployments from database management to middleware. Lastly, Oracle has a large global presence (Hestermann et al., 2009).

Oracle EBS has the following weaknesses: EBS has a broad and complex system that makes it difficult to use, and customisation is costly. EBS is associated with the Accelerator partner program, but implementations mostly involve tailoring ERP packages to meet customer needs which affects price and implementation time (Hestermann et al., 2009).

Infor Portfolio and Products

Infor has more than 25 ERP products globally and more than 70 000 customers. Infor acquired many of its customers through acquisitions of other ERP vendors which include SSA, MAPICS, Lilly Software, Epiphany, and Geac (AMR Research, 2007). Table 3 gives an overview of the Infor portfolio and products available in the SMME space.

Table 3: Infor Mid-market product evaluation (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. Of Employees)
Infor ERP LN	Infor ERP LN was acquired by Infor Global Solutions in 2006 from Baan. Infor selected LN as their flagship product.	Upper mid-market
Infor: ERP SyteLine	Infor SyteLine offers an integrated suite of ERP, Customer Relationship Management (CRM).and Supply Chain Management (SCM).tools.	Mid-market
Infor ERP Visual	This is a manufacturing-centric software solution for business units in large organisations that need specialized functionality.	Mid-market

Infor ERP LN is a niche product with broad functionality which is complex and costly to implement (AMR Research, 2007). Infor ERP SyteLine is a flexible system that is well suited for mid-market companies which are looking for a global footprint with dynamic configuration modeling needs. Due to various ownership and brand name changes, Infor SyteLine has insufficient marketing and lacks awareness in the market (AMR Research, 2007).

Microsoft Portfolio and Products

Microsoft Dynamics has a line of integrated and adaptable ERP business solutions. Microsoft Dynamics offers four ERP solutions which are Dynamics AX, Dynamics NAV, Dynamics GP and Dynamics SL (AMR Research, 2007). Table 4 presents an overview of the Microsoft Portfolio.

Table 4: Microsoft portfolio and products (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. of Employees)
Microsoft Business Solutions: Dynamics AX (Axapta)	Dynamics is the first of the Microsoft business suite ERP solutions. It is a product which was designed to grow with a business.	Medium to large organisations
Microsoft Business Solutions: Dynamics GP (Great Plains)	Dynamics GP was originally developed by Great Plains over a decade ago. Version 9.0 is currently available.	Small to medium organisations
Microsoft Business Solutions: Dynamics NAV (Navision)	A flexible solution which is aimed for small to medium sized organisations.	Small to medium organisations
Microsoft Business Solutions: Dynamics SL (Solomon)	Microsoft SL is focused on companies and service firms which are project driven.	Medium sized organisations

Microsoft Business Solutions' Dynamics AX (Axapta) was originally owned by the Danish company Damgaard. Gartner (2009) qualified Microsoft Dynamic AX as the leader in the current mid-market space. Dynamics AX (Axapta) has numerous strengths. Firstly, this application is user friendly and makes it easy for users to adopt the new system. Secondly, this application is highly scalable and the latest release has made it easy for its customers to work from one central software solution. Microsoft has a broad partner system which delivers a variety of industry and customer-specific solutions (Hestermann et al., 2009).

Microsoft Business Solutions Dynamics AX (Axapta) has the following weaknesses. Firstly, Microsoft Dynamics' partners do not support outside of Europe, which continues to make global deployment challenging especially in emerging economies. Secondly, this solution almost completely relies on partners which tend to modify the solution to an extent which makes upgrades difficult.

Sage Portfolio and Products

Sage currently has an 8 percent market share of total ERP software revenues globally. Sage has a presence on six continents with 150 channel partners and support partners and more than 14 000 licensed customers (Sage, 2010). Sage is focused on small and medium-sized organisations and focuses mainly on business management, healthcare, payment solutions, and

industry specific solutions (Business Software, 2009). Sage is branded Softline in Southern Africa. Sage offers five ERP packages, which are Sage Accpac ERP, Sage MAS 90 and 200, Sage MAS 500 ERP and Sage ERP X3. Table 5 describes Sage's products which are well suited for small and medium sized organisations.

Table 5: Sage portfolio and products (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. of Employees)
Sage ERP X3	Upper mid-market product suite in both South Africa and Australia. This product is developed in Europe.	Medium-sized organisations.
Sage Accpac ERP	Developed in North America and customised locally in South Africa.	Small and medium sized organisations
Sage Pastel Evolution	Pastel Evolution is a South African product which offers ERP solutions for small to medium sized organisations.	The mid-market in South Africa is much smaller than those in the United States and Europe.

Sage is currently the volume market leader globally. Sage is the leading player in USA, Australia, Middle East and Asia and has 70 percent market share in South Africa across all ERP product ranges (Alberts, 2008).

Epicor Portfolio and Products

Epicor has been voted the most visionary in the market due to its use of modern technology (Hestermann et al., 2009).

Epicor 9 Vantage has the following strengths: Firstly, Epicor 9 is easy to modify and extend, and supports a range of platforms. Secondly, Vantage's Service-Oriented Architecture (SOA) provides an advantage for companies that encourage technology platform independence among business units. Lastly, Vantage is served through direct sales and the architecture of Epicor 9 makes it the closest solution to a model-driven application available on the market.

Epicor 9 Vantage has various weaknesses: Firstly, Vantage only has a strong presence in North America. Secondly, Vantage is broad for a mid-market ERP solution and as a result some areas of Epicor 9 will be richer and more complex compared to other areas. Table 6 identifies the main characteristics of Epicor 9: Vantage.

Table 6: Epicor Vantage portfolio and products (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. of Employees)
Epicor 9: Vantage	Vantage is a product-centric ERP solution which is built on SOA using Microsoft.NET, Progress and Web services. Vantage's target market include make-to-order and mixed-mode manufacturing companies.	Medium-sized organisations.

Syspro Portfolio and Products

Syspro was founded in 1978 and was one of the first vendors to develop ERP solutions. Syspro has been named one of the top 15 ERP vendors for 2010 (Business Software, 2009). Table 7 below highlights the Syspro products descriptions and portfolio.

Table 7: Syspro product description and portfolio (Hestermann et al., 2009)

Vendor and Products	Description	Target Market (No. Of Employees)
Syspro	This company was founded in 1978 and has offices on six continents and Syspro has more than 150 channels and 14 000 customers.	Medium enterprises

Syspro has the following benefits: Firstly, Syspro's manufacturing functionality is focused on the lower mid-market and the product is tailored to meet individual business requirements. Secondly, Syspro provides a good service and is rated highly among customers. Lastly, Syspro offers a variety of attractive options as a Tier 2 solution in a multitier strategy (Hestermann et al., 2009).

Syspro has the following weaknesses: Firstly, Syspro is a small vendor and cannot easily expand their market to a broader market. Secondly, Syspro partners are mainly small and are based in the United States of America and they have limited international reach. Lastly, Syspro has poor customer performance ratings (Hestermann et al., 2009).

2. Software as a Service for SMMEs

The section below highlights various Software-as-a-service (SaaS) ERP products available to SMMEs.

Table 8: Software as a Service providers for SMMEs

SaaS Vendor	Description
NetSuite: NetERP	NetERP is an ERP solution from NetSuite. NetSuite is currently the largest SaaS-based ERP suite (NetSuite Inc, 2004).
Epicor 9	Epicor 9 uses web 2.0, which can be deployed onsite or using SaaS (Epicor, 2011).
SAP Business ByDesign	SAP Business ByDesign is a business on demand software application, but this is currently not yet available in South Africa (SAP, 2011).
Workday	Workday offers an alternative ERP solution. Workday is designed to cater for the needs of a global company. This application is available in multiple languages, currencies and business entities in one single solution. There is currently one service provider in South Africa (Workday, 2011).
Glovia	Glovia ERP on demand is focused on manufacturing solutions. There are currently two resellers in South Africa (Glovia, 2011)
Plex Online	Plex Online SaaS.ERP connects and manages the entire manufacturing process (Plex Online, 2011).
Softline: SaaS	Softline has the strength of Softline Accpac's ERP and CRM software, while the data centre is managed externally (ITweb, 2010).

3. Open source ERP products for SMMEs

Open source software (OSS) has a small presence in the ERP space. During the past two years, some new open source ERP vendors have emerged aimed at reducing the total cost of business applications (Hestermann et al., 2009). There is a handful of ERP OSS vendors which are seen as business ready (Rashid, 2008). Table 9 identifies ERP OSS products available.

Table 9: Popular open source ERPs as at 17 January 2008 (Open Source ERP Guru, 2008)

Product	Description
Compiere	This product has several vertical market solutions which include distribution, retail, manufacturing and professional services industries.
OpenBravo	Openbravo is designed by a Spanish company also known as Openbravo. This application differs from other OSS as it is completely web based and it is designed specifically for SMEs.
ERP5	ERP5 is the other mid-market open source solution.
Opentaps: Sequoia ERP	Opentaps is a small business OSS provider.
xTuple: OpenMFG	OpenMFG is an OSS for manufacturing systems. It is meant for organisations of all sizes.
Adempiere	Adempiere is a popular Open Source ERP and has been implemented in various countries globally. (http://www.adempiere.com/index.php/ADempiere_Implementations_around_the_world .)

The graph in Figure 1 depicts the number of Open Source downloads for ERP products in 2008.

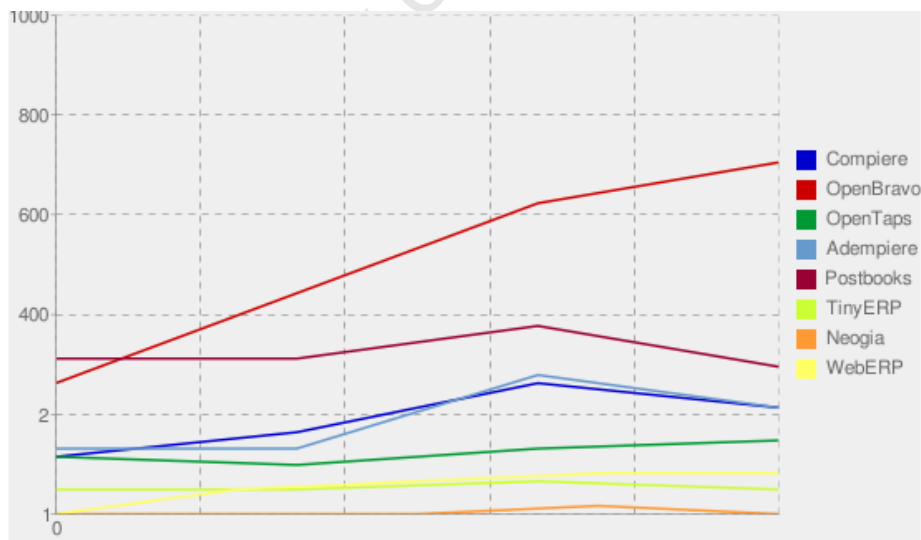


Figure 1: Open Source ERP downloads (Open source ERP Guru, 2008)

Appendix C: Case Studies

Company A	A medium-sized organisation with 131 permanent staff members in two branches in Johannesburg and Cape Town was selected, based on the aforementioned criteria. The organisation specialises in service delivery (business service industry sector) through the provision of learning resources to various clients in South Africa.
Reseller implementing ERP in Company A	This is a small company consisting of 9 employees implementing ERP and CRM packages in the Western Cape. This company has a big customer base in the Western Cape and is now moving towards implementing packages in upper-medium sized organisations.
Company B	Company B, specializes in the area of precision mechanical manufacture. This company has a range of capabilities such as prototyping through development and industrialisation, to large volume series production for the international markets. Core products are: mechanical fuses, safe and arm devices, kinetic energy weapons and naval counter-measures (mine clearing devices and moored mine cable cutters).
Reseller implementing ERP in Company B	This reseller is a small branch company which consists of four employees, but belongs to a bigger organisation which implements ERP packages across Africa. This reseller only specialises in ERP packages in small and medium sized organisations and focuses on the manufacturing industry.