Victoria Tulivaye Hasheela-Mufeti

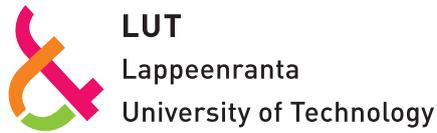# EMPIRICAL STUDIES ON THE ADOPTION AND IMPLEMENTATION OF ERP IN SMES IN DEVELOPING COUNTRIES

LUT
Lappeenranta
University of Technology

Victoria Tulivaye Hasheela-Mufeti

EMPIRICAL STUDIES ON THE ADOPTION AND IMPLEMENTATION OF ERP IN SMES IN DEVELOPING COUNTRIES

Supervisor   Professor Kari Smolander
                LUT School of Business and Management
                Lappeenranta University of Technology
                Finland

Reviewers   Associate Professor Lisa Seymour
                Department of Information Systems
                University of Cape Town
                South Africa

                Professor Pasi Tyrväinen
                Department of Computer Science and Information Systems
                University of Jyväskylä
                Finland

Opponent   Associate Professor Devinder Thapa
                Department of Information Systems
                University of Agder
                Norway

Abstract

Enterprise resource planning (ERP) helps organizations to centralize their activities, to improve their communications, to reduce their operational and maintenance costs, and basically to have a single integrated application throughout an organization, among many other benefits. Initially, it was only implemented by large organizations, but now small and medium-sized enterprises (SMEs) are also implementing it. It was also initially implemented in the developed countries where it was developed. But that too has changed and now companies in developing countries are implementing ERP too.

The research objective of this study is to investigate the adoption and implementation of ERP systems in developing countries. The study employed several research methodologies, but it was dominated by grounded theory. The data of the study was collected from 30 companies. Thirty-nine interviews were conducted in those companies with the owners of SMEs and the employees of both large organizations and SMEs.

The results of the study suggest that there are several factors that influence the adoption of ERP by SMEs. The study has also identified challenges that hinder SMEs from adopting ERP. It also identified challenges that SMEs undergo when implementing ERP and after implementation. The data collected was used to identify the requirements that are necessary for SMEs to have a successful ERP implementation.

The results of the study can be used by SMEs that are planning to implement ERP, to help them achieve successful implementations. It can also be used by ERP vendors to understand the challenges of SMEs and to develop systems that suit them best.

Keywords: Small and medium-sized enterprises, ERP systems, developing countries, grounded theory, qualitative research

Acknowledgements

writing of this thesis. I am truly lucky to have such a supporting and loving husband that you are.

To my newborn son Pandulo Leuyependa Mufeti, you gave me a reason to focus on my dissertation, so that I would not have to share you with it when you arrive. Thank you for the courage you gave me. You are my little sunshine.

Above all, I am truly grateful to the Almighty God for the Grace He has shown me throughout the programme.

Victoria Hasheela-Mufeti
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Windhoek, Namibia

This thesis is dedicated to my parents,
Tate Veikko and Meme Hilja Hasheela

Contents

Publications

List of publications

The reprints of the articles are included at the end of this work.

This thesis is based on the following papers. The rights to include the papers in dissertation have been granted by the publishers.

I.   Hasheela, V. (2015). On-premise ERP Organizational Post-implementation Practices – Comparison between Large Enterprises and Small and Medium-Sized Enterprises. *17th International Conference on Enterprise Information Systems*, ISBN 978-989-758-096-3, pp. 243-250. DOI: 10.5220/0005348802430250

II.   Hasheela-Mufeti, V. and Smolander, K. (2016). What do we know about Cloud ERP in SMEs? *13th European, Mediterranean & Middle Eastern Conference on Information Systems 2016*, ISBN 9789606897092, pp. 53–67

III.   Hasheela, V., Smolander, K., and Mufeti, K. (2016). An investigation of factors leading to the reluctance of SaaS ERP adoption in Namibian SMEs. *The African Journal of Information Systems*: Vol. 8, Iss. 4, Article 1. Available at: http://digitalcommons.kennesaw.edu/ajis/vol8/iss4/1

IV.   Hasheela-Mufeti, V. and Smolander, K. (2016). Challenges of ERP Implementation in SMEs: Empirical Study in Developing Countries. In: *13th European, Mediterranean & Middle Eastern Conference on Information Systems 2016*, ISBN 9789606897092, pp. 200-211.

V.   Hasheela-Mufeti, V. and Smolander K. (2017). What are the requirements for a successful ERP in the African context? Special focus on SMEs. *International Journal of Information Systems and Project Management*: Vol. 5, No. 3.

The author's contributions

Victoria Hasheela-Mufeti is the principal author of Publications I, II, III, IV, and V. For Publication I, she conducted the case studies in six companies, analyzed the data, and wrote the paper. The supervisor reviewed the paper, commented on it, and gave professional advice on how several passages could be improved. The paper was published as a conference paper.

Publication II: Victoria Hasheela-Mufeti carried out the systematic mapping study and wrote the paper. The supervisor reviewed the paper, provided valuable comments, and changed some text.

Publication III: Victoria Hasheela-Mufeti conducted the research in fourteen organizations. She came up with the interview questions and organized the interviews. In addition, she also prepared an online survey and sent it to different participants. Afterwards she performed the data analysis. Finally she wrote the paper. The supervisor reviewed and commented on the paper, and gave valuable suggestions and comments.

Publications IV: Victoria Hasheela-Mufeti conducted the study in fourteen organizations. She then wrote the paper. The supervisor reviewed and commented on the paper. Kauna Mufeti participated in the writing of the paper and worked on the comments.

Publication V: Victoria Hasheela-Mufeti carried out the study, she analyzed the data using thematic analysis to try and understand how the challenges found in Publication IV can be solved or overcome in order to achieve successful implementation. She then wrote the paper, which the supervisor edited, and added suggestions and comments.

Nomenclature

Abbreviations

CRM	Customer relationship management
DOI	Diffusion of Innovation
ERP	Enterprise resource planning
GT	Grounded theory
GTM	Grounded theory methodology
IS	Information systems
ICT	Information and communication technology
IT	Information technology
ITU	International Telecommunication Union
LE	Large enterprises
MRP	Manufacturing resource planning
SCM	Supply chain management
SME	Small and medium-sized enterprises
SMS	Systematic mapping study

16   Nomenclature

1 **Introduction**

Enterprise resource planning (ERP) systems are being implemented worldwide by companies of different sizes. An ERP system integrates data and processes from different functional areas within an organization into one place. It allows transparent access to information that in return improves strategic decision making (Gore, 2008). ERP is also known to help organizations meet their development objectives as well as to sustain their visibility in the market (Mhlanga et al., 2012). It reduces the organizations' operating costs as well as improving relationships between suppliers and customers (Ross and Vitale, 2000).

ERP was originally developed for large organizations (Molla and Bhalla, 2006) as they have better-defined business processes and defined strategies (Mabert et al., 2003). In addition, ERP was originally implemented in developed countries.

Even though developing countries are known to have limited infrastructure and limited economic power, organizations in developing countries have also started implementing ERP systems. In addition, not only large organizations are implementing these systems nowadays, small and medium-sized enterprises (SMEs) have followed suit. Ajitabh and Momaya (2004) stated that the competitiveness of a firm is measured by its capability to provide goods and services more efficiently in comparison to others in the same market. It is therefore crucial for organizations to adopt innovations and develop competencies that will help them achieve competitive advantage in their markets. SMEs have also started adopting ERP systems in order to have competitive advantage.

Many SMEs do not only focus on domestic markets, they also compete globally. Hence, they also seek to streamline their operations through ERP systems in order to benefit from these capabilities (Seethamraju, 2015). SMEs are known to show poor performance and sometimes fail due to several factors (Hemer, 2011). Some of these factors are related to poor strategies, poor financial capabilities, and low volumes of human resources (EIB, 2011).

Since SMEs in developing countries are also implementing ERP systems, there is a need to understand how organizations in developing countries adopt these systems, what their motivations are, their challenges, and their risks. By understanding the challenges and risks that SMEs go through it will be possible to develop solutions that will be applicable to other organizations, and these solutions will help them to achieve successful implementations. In the same

manner, ERP developers can also learn about these challenges and develop suitable software for these organizations.

The objective of the study is to further develop empirical knowledge of the adoption and implementation of ERP systems in SMEs in developing countries. The focus is on the motivations of the adoption, the activities that take place, and the challenges that SMEs face. The thesis seeks to answer the following main question:

How can SMEs in developing countries successfully implement ERP?

The contributions of the dissertation are as follows: We investigated different practices in large organizations and small and medium-sized organizations, in order to get an understanding of different ERP activities and how they differ between companies of different sizes. We identified several differences and suggested ways in which SMEs can learn from large enterprises (LEs). We also investigated the state of research on Cloud ERP in SMEs and identified research gaps. We also looked at factors causing the hindrance of cloud ERP adoption in developing countries. We further explored challenges facing SMEs in developing countries in their ERP projects and suggested ways to minimize them. Lastly, we provided insights into what can be regarded as requirements for a successful ERP implementation in Southern Africa. In order to achieve our objectives, 49 interviews with several managers were conducted in 32 enterprises.

The study consists of two parts. The first part consists of the introduction and the second part consists of the appendix. The introduction consists of six chapters. Figure 1 illustrates the chapters and how they are presented in the thesis. Chapter 1 introduces the thesis, and presents the research objectives and research questions. Chapter 2 presents the background related to SMEs and to research on ERP implementation in developing countries. Chapter 3 presents the research process and further describes the research methods that are used. Chapter 4 presents the overview of the five publications that are included in this thesis. Chapter 5 discusses the contribution and implications of the study results. Finally, Chapter 6 concluded the thesis and gives suggestions for future research.
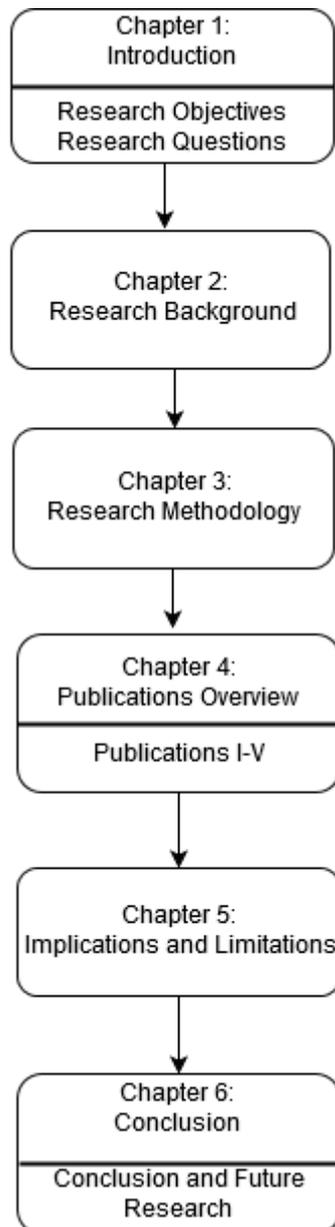
Figure 1: An illustration of the chapters

2 The Research Background

The purpose of this chapter is to describe the definitions and concepts that are related to this research. These definitions and concepts are obtained from related literature. Firstly, the chapter presents the background of SMEs. Secondly, it presents the background of the digital divide between developed and developing countries and their economic and technological differences. Thirdly, the chapter presents the definitions, the history, and the related research of ERP. It further discusses ERP in developing countries.

2.1 The Digital Divide

The World Bank has classified countries according to their level of economy, geographical regions and by the operational lending categories (World Bank, 2016). Currently the economies are divided into four income groups, namely: low-income, lower-middle-income, upper-middle-income, and high-income economies. This is measured by using the gross national income per capita, which is converted from a country's local currency to US dollars. The countries with economies labeled as *low-income and lower-middle-income* fall under the category of *developing countries* (World Bank, 2016). They are also referred to as *third world countries*, while countries with *upper-middle-income* and *high-income* are called *developed countries*.

Information and communication technology (ICT) is one of the leading drivers of growth, and it significantly contributes to productivity growth, with approximately 20% of this coming from the ICT sector (Singh et al., 2008). However there is a difference in ICT adoption and usage between developed and developing countries. For example, at the moment, 3.2 billion people in the world are connected to the internet, but the broadband in developing countries is relatively slow and much more costly (International Telecommunication Union, 2013).

The digital divide refers to a division between individuals who have reliable access to a network connection, software, and hardware in order to use ICT and those who do not have good access or have none at all (Organization for economic cooperation and development (OECD), 2001). There is a digital divide between developed countries and developing countries. Walterova and Tveit (2012) have identified three elements that determine the digital divide, namely: age, education, and income. They have also identified other factors, such as geographical factors, the lack of availability of computers, and the lack of ICT

skills. They believe that people in rural areas are often cut off from using technologies due to the lack of networks in those areas. They also believe that those with no ICT skills are cut off. Millions of people in the developing countries are left behind (Walterova and Tveit, 2012).

There is a measure used to measure the use of ICT in different countries known as the ICT Development Index (IDI) (International Telecommunication Union, 2013). The 10 countries with the highest IDI values are all developed countries in Europe, while the 10 countries with the lowest IDI index are developing countries. Many developing countries lack the necessary infrastructure—such as efficient communication channels and reliable bandwidth—that is needed to run enterprise systems (Castells, 1998). Finland, the country in which this thesis was written, has an IDI value of 8.31 and it was ranked eighth in the world, while Namibia, a developing country in which most of the research for this thesis was done, has an IDI value of 3.24 and was the 117th in the world in 2013 (International Telecommunication Union, 2013). Overall, the average IDI value of developed countries is 7.20, while that of developing countries is 3.67, which is almost half of the developed countries' average IDI value. Africa has the lowest IDI value among all six of the regions. It is also noted that it has the least affordable broadband prices, either fixed or mobile (International Telecommunication Union, 2013).

Kim et al. (2005) classified people without access to technology into two groups, namely: *digital laggards*—those who are willing to adopt ICT but are unable to due to different reasons, such as poverty, disability, and being underprivileged; the second group is named the *out-digitals*, which the author refers to as those that are not willing to adopt ICT at all. Hacker and Mason (2003) categorized the digital divide into different categories. The first category is the digital divide that exists between the rich and the poor. The study explains that the divide between the rich and the poor is caused by different factors, such as education and income, as these determine who can afford a computer, access to the internet, etc. The second category that the study defined is the linguistic and cultural category. The study explains that countries whose people speak English and other common languages (such as French and Spanish) have more gain from the internet in comparison to those who do not speak any of these languages (Hacker and Mason, 2003) as many websites and ICT-related knowledge are only available in English and a few other European languages.

Obayan (2010) has identified several other factors that contribute to the digital divide: staff that are not trained sufficiently, a shortage of information in different languages, and a lack of network connections in rural areas. Oftentimes,

internet connections in developing countries are limited to major cities, hence the rural areas are left out (Obayan, 2010).

2.2   **SMEs**

There is no single definition of an SME. It differs from country to country, and from organization to organization. For example, South Africa defines their SMEs based on the sectors to which they belong. Small businesses in the Agricultural sector are those with 50 or less employees and a turnover of 185 000 euros or less, while a medium-sized company consists of equal to or less than 100 employees, but greater than 50, and a turnover of less than or equal to 308 000 euro but greater than 185 000 euros (National Small Business Act, 1996). This is not the same for other sectors.

The European Commission defines an SME as "a small and medium-sized organization that employs fewer than 250 employees and has an annual turnover not exceeding 50 million euro" (European Commission, 2005). This definition does not differ among different sectors and it is therefore better to use. This study adopts this definition based on the fact that the EU has standardized the definition better than many countries, hence making it easy to follow. Table 1 shows a more detailed definition according to the European Commission.

Table 1: The definition of an SME (European Commission, 2005)

Company category	Staff headcount	Turnover
Medium-sized	< 250	≤ €50 m
Small	< 50	≤ €10 m
Micro	< 10	≤ €2 m

SMEs have become an economic backbone globally (EIB, 2011), and the number of SMEs in the world continues to grow as entrepreneurs continue to take new innovations into the market. Many have extended their domestic activities across national boundaries in order to grow their businesses.

There are however many difficulties that their operations experience. (Ramsden, 2010) has summarized these as: the lack of access to financial services, poor or inadequate infrastructure, and the regulation of business (such as getting licenses and permits to operate), and the lack of specialized management skills. The human resources, the financial capabilities, organizational culture, and the

management strategy of SMEs are very different from those of large enterprises (LEs).

Financing from financial institutions is one of the main difficulties SMEs experience, and this affects their development (Brown and Nasuti, 2005). Unlike LEs who can easily take out loans or even invest in foreign markets with good returns, SMEs are limited because financial institutions usually need some kind of guarantee or collateral which SMEs hardly possess (EIB, 2011). Therefore this negatively affects SMEs when making decisions that involve high costs.

Also, considering their limit to market access there is their lack of efficient channels of distribution. This leads to less purchasing power of customers in comparison to their LE counterparts that have access to wider markets (Franco and Haase, 2010).

On the other hand, SMEs also have advantages over LEs. For example, considering the few number of people in the organization, decision making in SMEs lasts for a shorter duration, and the process of decision making is less complicated in comparison to that of LEs (Jennings and Beaver, 1995; Turner et al., 2012).

Difficulties are also experienced in recruiting qualified staff, as many would rather work in established large organizations (EIB, 2011). This is often because highly educated individuals require high salaries that SMEs cannot afford. At times, SME owners have little or no qualifications and experience, and this can have an impact on the development of the company (Franco and Haase, 2010). This often leads to poor management strategies, which result in poor performance due to the multiple roles played by the owners (Jennings and Beaver, 1995). In SMEs, the owner is often responsible for ensuring that the objectives of the company are carried out and that its vision is fulfilled. They are also often the sole contact in the company's operations' dealings (Filion, 1991). They are also known to concentrate more on the company's effectiveness more than they do on efficiency (Gelinas and Bigras, 2004). There is however a difference between an experienced manager coming from a large organization and starting up their own company and one who has no experience at all. While an experienced manager understands the practices and the requirements of an organization (Usman and Vanhaverbeke, 2017), start-ups' owners with no previous experience present big challenges (Usman and Vanhaverbeke, 2017).

2.2.1 SMEs in developing countries

Several studies (Buonanno et al., 2005; Gelinas and Bigras, 2004b; Huin, 2004; Ramsden, 2010) have looked at the challenges faced by SMEs. Many of these studies are conducted in developed countries. However, the findings from these countries cannot be generalized to SMEs in developing countries due to the differences between developed and developing countries. SMEs in developing countries face several challenges that are specific to them, for example infrastructural, legal, and social barriers (Kapurubandara and Lawson, 2007).

Pissarides (1999) found that the lack of financing is a major obstacle for SMEs in developing countries due to capital markets that are poorly developed. In addition to the lack of financing, there are also major factors related to technology, corruption, and location (Gree and Thurnik, 2003). A survey conducted in Sub-Saharan Africa, Eastern Europe, and Central Asia has identified several barriers affecting SMEs (Wang, 2016).

Table 2: The barriers affecting SMEs in developing countries (Wang, 2016)

High tax rates
Unstable electricity
Managers' lack of experience
Corruption
Crime
Political instability
Unstable telecommunications
Inadequately educated workforces

SMEs in developing countries are often focused on short-term visions, and they hardly possess an understanding of business ethics (Wang, 2016). They do not know the importance of formal business structures. However when they are the suppliers of products for large organizations, or when they secure big projects, they usually have to ensure quality assurance and product delivery planning in order to win the trust of their clients (Mahmood, 2014). Companies often acquire ICT to achieve this.

There has been an increase in literature about SMEs in developing countries adopting ICT. However many of these studies look at technologies such as e-commerce and other related technologies (Kapurubandara and Lawson, 2007). There is an increase in SMEs adopting ERP systems, however very few studies have been carried out. This demonstrated the need for further studies in this research area.

2.3 **ERP**

ERP is a system that integrates several functional areas into one system. Before the implementation of ERP systems, organizations had separate application systems that did not communicate with each other. There was no integration between different functional areas (Botta-Genoulaz and Millet, 2005). Business processes were usually long due to a lack of communication between different departments, and this led to lengthy production delivery (Amoako-Gyampah, 2007).

ERP systems are used to manage enterprises' data and to integrate several functional areas into one system. It is one of several enterprise systems that organizations adopt. *Enterprise systems* in general refers to "software that enables the integration of transaction-oriented data and business processes throughout an organization" (Markus and Tanis, 2000). The common enterprise systems are ERP, customer relationship management (CRM), and supply chain management (SCM) (Shang and Seddon, 2002). ERP allows companies to automate their business functions (such as human resources, sales, logistics, and finance), and it has the capabilities of centralizing administrative activities, easing communication among different functional departments, and reducing information technology (IT) costs in an organization (Gattiker and Goodhue, 2005). It is also known to increase the productivity and efficiency of organizations (Brown and Nasuti, 2005). ERP has the capability to have the whole organization under its control, and it can monitor all the orders, cash flows, and any other key important information that management would like to keep track of (Mehrjerdi, 2010).

ERP has three core elements: technical, functional, and business elements (Akkermans et al., 2003). (Akkermans et al., 2003) explained the technical perspective from the development side of ERP, stating that it has availed tools that are used to control and monitor resources in an organization. As management support, it eases the process of deploying resources in an organization. For example, controlling the process flows (such as the ordering and purchasing processes) from the business perspective. Akkermans et al.

(2003) also defined ERP as a system that both binds different business areas and powers an entire corporate.

Davenport (1998) has illustrated ERP in detail (see Figure 2).

Front-Office **Corporate Reporting** **Back-Office**

C U S T O M E R S

Sales & Distribution

Service Applications

Central Database

Financial Applications

Manufacturing Applications

Inventory Management

Human Resources Management

S U P P L I E R S
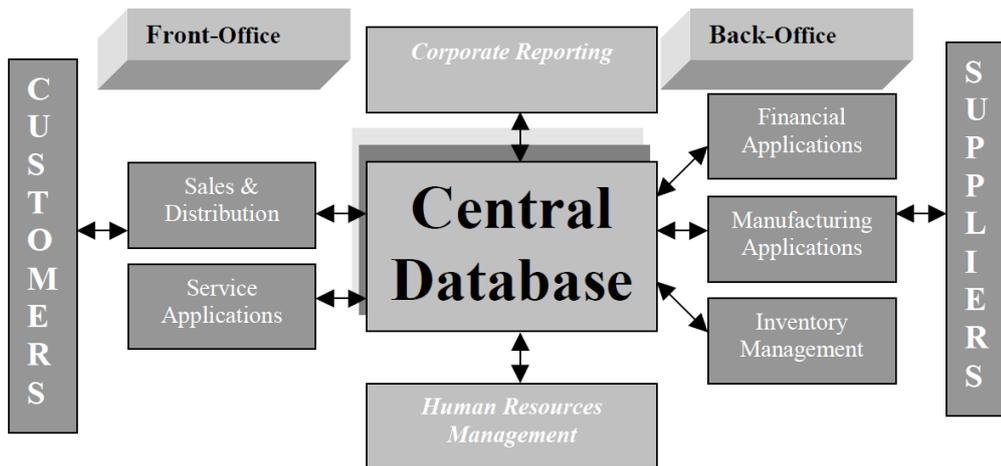
Figure 2: The concept of ERP systems (Davenport, 1998)

There are many benefits that prompt organizations to invest in ERP systems. Based on the fact that it provides important information on business performance across the whole organization, it helps managers to make appropriate decisions. It also helps improve the process of production, distribution, and customer service (Rainer et al., 2015), leading to improved communication among different functional areas (Nwankpa and Roumani, 2014). In addition, ERP helps integrate different information, such as financial information, customer order information, and HR information (Nazemi et al., 2012). ERP also improves interaction among different business functions and it makes information more reachable.

(Sadrzadehrafiei et al., 2013) also identified several ERP benefits, such as: improving supplier performance, improving interaction between business units, improving employees' performance management, and improving customer satisfaction. It also eliminates data redundancy, and reduces the production cycle time and operational costs. It also improves scalability and maintenance (Hossain et al., 2002).

Despite the many benefits, shortcomings are also identified in ERP systems. For example, vendors often develop them based on the best practices that they know

and, as a result, companies often have to adapt their business processes to the ERP systems' in-built processes when these predefined processes are not always best for all companies (Hossain et al., 2002). Also, ERP systems are very complex and expensive, and, if not managed well, can result in failure (Mutaz and Al-Lozi, 2012).

A large amount of ERP research exists. However much of this research is done in developed countries. There is lack of research that focuses on ERP implementation in developing countries.

2.3.1 ERP in developing countries

In comparison to developed countries, the rate at which companies are adopting ERP in developing countries is very low. One of the apparent reasons is the difference in wealth between the two different worlds (developed and developing countries), given the fact that ERP systems are very costly (Hawari and Heeks, 2010).

However the significant differences are proof that the reasons go beyond costs. Brehm, Heinzl, and Markus (2001) have identified the differences in the alignment between organizational requirements and ERP as one of the problems that is faced worldwide as internal processes are not universal (Brehm et al., 2001). Similarly, there is also a vast difference in the economic development between organizations in different countries. This also contributes to the variety in the adoption.

Seventy percent of ERP implementation in developing countries did not deliver the expected benefits due to different legal and government regulations (Dezdar and Ainin, 2011). ERP systems developed in one context cannot be universal, hence misfits will be experienced in other contexts (Dezdar and Ainin, 2011).

According to a case study by Hawari and Heeks (2010), assumptions that there are both a broadband internet connection and stable local area networks in every country are usually made before the designing of the system, which is not always the case. The level at which developed countries are at is not the same as it is for developing countries. The same study also found that due to the fact that ERP systems were designed for large organizations, the business practices have considered and reflected the organizational and national cultures in developed countries. Therefore problems and misfits are likely to happen when these same systems are implemented in Africa and in other developing regions (Hawari and Heeks, 2010).

In general it can be said that the implementation of ERP in developing countries is often affected by poor infrastructure, high costs, informal structures, insufficient human resources, misfits, and other related limitations.

Despite the differences in practices between ERP business processes and business operations in developing countries, these countries continue to adopt ERP systems. Therefore these differences need to be addressed. Many studies have looked at different challenges as well factors hindering adoption by companies in developing countries. However there is a research gap in attempting to find solutions to the identified problems and failure factors.

2.3.2   Challenges facing developing countries in ERP projects

There are challenges that developing countries experience when implementing ERP. One of the main challenges is the cost. ERP systems are very expensive for companies in developing countries (Rajapakse and Seddon, 2005). ERP was originally initiated by large organizations, and most companies in developing countries are not that large and do not have enough turnover to afford ERP implementation and maintenance costs (Huang and Palvia, 2001).

In addition, all the companies that are major players have developed ERP systems using the best practices of companies in developed countries (Publication IV). For example, ERP systems are made to expect decision making at all levels (Krumbholz et al., 2000), however studies in developing countries found that companies in developing countries often have cultures that allow top management to make all the major decisions and middle management only makes small decisions (Wang, 2016). Due to system misfits between built-in processes and companies' realities, heavy customization is usually necessary, which can lead to delays in the projects and it also results in system bugs that are not solved (Wang, 2016).

A lack of knowledge, a lack of ERP experience, and low IT maturity also cause challenges in developing countries (Huang and Palvia, 2001). Local agents often carry out ERP implementations in these countries because there are limited or no ERP vendors in the area (Rajapakse and Seddon, 2005), and these agents do not have sufficient knowledge about the systems: "Local agents are not always able to provide professional advice regarding ERP project planning" (Wang, 2016). Low IT maturity in developing countries is also a major problem, and it manifests in poor IT strategies (Wong et al., 2005). The available consultants in developing countries also often lack knowledge, resulting in the delivery of training of poor quality (Wang, 2016).

ERP vendors often assume that the implementation organizations have strong local area networks and enough servers, which is not always the case. As stated by (Walterova and Tveit, 2012), millions of people in developing countries are cut off from using technologies due to the lack of networks in those areas. (Chatterjee, 2015) has found that a lack of organizational infrastructure causes challenges in ERP projects.

2.3.3   The critical success factors (CSFs) of ERP implementation in developing countries

Fruhling and Digman (2000) defined CSFs as the few things that should take place in order for a business to be successful. Some of the studies that identified CSFs were carried out in developed countries, while other studies were done in developing countries. It can be said that there are no significant differences between the success factors for developed and developing countries. However some factors are more popular in developed countries than in developing countries and vice versa.

Moohebat (2010) did a study that compared CSFs in developed and developing countries. The study found that the most popular factors in developing countries are "a fit between ERP and the company's business processes" and "change management." Other CSFs—such as business plans, business process engineering, communication, data accuracy, and project management—carry approximately the same weight (Moohebat, 2010) in both developing and developed countries.

There are several other CSFs for ERP systems that have been identified in previous research (Table 3).

Table 3: CSFs in ERP implementations

CSF	References
Top management support	(Loh and Koh *, 2004; Venugopal and Rao, 2011; (Liu, 2011); (Žabjek et al., 2009); Garg and Agarwal, 2014; Law and Ngai, 2007; Ngai et al., 2008; Zhang et al., 2005; (Somers and Nelson, 2004))
Effective communication	(Falkowski et al., 1998); (Rosario, 2000); (Shanks et al., 2000); (Wee, 2000)

User involvement	((Venugopal and Rao, 2011); Garg and Agarwal, 2014)
Business process requirements	((Liu, 2011); (Dantes and Hasibuan, 2011); (Falkowski et al., 1998); (Murray and Coffin, 2001); (Shanks et al., 2000); (Wee, 2000); (Žabjek et al., 2009); (Garg and Agarwal, 2014); (Ettlie and Rubenstein, 1980))
Change management	(Liu, 2011); (Žabjek et al., 2009); (Loh and Koh *, 2004)
Monitoring & evaluation of performance	(Murray and Coffin, 2001); (Wee, 2000); (Rosario, 2000)
The selection of a good ERP package	(Leyh, 2016; Loh and Koh *, 2004)
Project management	(Venugopal and Rao, 2011);(Garg and Agarwal, 2014)
ERP teamwork	(Murray and Coffin, 2001); (Rosario, 2000); (Wee, 2000); (Garg and Agarwal, 2014); (Shanks et al., 2000)
Clear vision and efficient business plan	(Al-Mashari et al., 2003; Loh and Koh *, 2004)

Top management support: Top management support refers to the involvement of company executives in the implementation process of ERP (Sharma and Yetton, 2007). Top management support is the most identified CSF, which shows that it is very crucial for the project to have good support from management.

An ERP project requires a lot of time and financial commitment, and therefore the enrolment of company management is necessary (Ngai et al., 2008). Company management has the responsibility of availing funds, steering direction, and setting the goals that should be achieved (Zhang et al., 2005).

Company executives need to show their support towards the project, so that all stakeholders will know the amount of dedication the ERP project is getting (Somers and Nelson, 2004). When employees see that a newly introduced software is supported and promoted by company management, they are likely to accept it much more easily (Finney and Corbett, 2007).

ERP teamwork: Effective project management is very critical in ensuring a successful ERP implementation (Garg and Agarwal, 2014). A project team consisting of a balance of business and technical skills is a very crucial factor in ensuring ERP implementation success (Parr and Shanks, 2000). (Shanks et al., 2000) and also Nah et al. (2001) identified a balanced team project team as a CSF. A combination of experts from both the technical and business perspectives is critical for the success of ERP implementation (Nah et al., 2001; Somers and Nelson, 2004). It is also important that the team members assigned to the project are not allocated other duties outside the project, as they need to attend to the project full time so that they can give their full concentration with no distractions (Shanks et al., 2000).

Effective communication: There is a need for communication among different functional areas (Mandal and Gunasekaran, 2003) as well as among business and IT experts (Rosario, 2000). It is essential to keep up communication during the implementing phase , and to keep it open so that end users (employees) also know that it is going on (Mandal and Gunasekaran, 2003). Communication encourages support among employees and stakeholders, and it also builds trust (Nah et al., 2001).

Monitoring and evaluation of performance: Murray and Coffin (2001) stated that it is important for company management to be involved from the beginning so that they can monitor the process and provide guidance. They believe ERP implementation should not only be seen as a responsibility of the IT department. Constant monitoring of progress helps to discover any errors at an early stage when they can still be corrected (Al-Mashari et al., 2003).

Business process requirements: It is important to have a blueprint of the present practice of the business processes, consisting of business events, the different tasks of the business and the employees responsible for them, and information flow within the business (Jenson and Johnson, 1999). This is important as it will help the analysis of how the business is currently, what the ERP system consists of and what can be done to make the ERP system work for the organization. Re-engineering the business processes to make them

compatible with the implemented ERP system helps make the implementation successful (Ettlie et al., 2005).

User involvement: If users are involved in the ERP implementation process, they will accept the system easily, and anxiety when using it will be low (Garg and Agarwal, 2014). In addition to affecting user acceptance, it also increases user satisfaction as the users already learn about the system's capabilities during implementation (Garg and Agarwal, 2014). The participation of all stakeholders that will be affected by the ERP implementation will also help in achieving user acceptance (Esteves, 2009)

Project management: Project management comprises of tracking the project schedule and budget among other management tasks (Upadhyay and Dan, 2008). An ERP project is a complex project that requires a good project manager that is able to oversee requirements, ensure that both the required workforce is available and milestones are met, work out equipment requirements, and manage the budget (Dezdar and Ainin, 2011). The project manager should also monitor all the tasks going on with the project and ensure collaboration among different stakeholders. It is important that the project manager is able to manage both tactically and strategically (Al-Mashari et al., 2003) .

Change management: Change management goes hand in hand with user involvement. It is important to have a change management strategy that will help ensure that all affected parties will be included in the implementation process, that the expected changes are communicated to them, and that training is made available for them (Al-Mashari et al., 2003). This will help employees to accept the changes (Xu et al., 2013).

The selection of a good ERP package: It is important to select an ERP system that is fit for the organization in terms of size, line of business, location, etc. It limits the need to customize the system, which can have a negative impact on the company's success (Loh and Koh *, 2004). It is important for a system to be implemented according to their inbuilt systems and not be heavily customized (Leyh et al., 2016). It is important that the system is adapted according to their processes.

A clear vision and efficient business plan: A good business plan which includes estimated costs, projections, risks, schedules, and benefits is perceived as a CSF as it helps the company to focus on the specified goals in order to harvest the intended outcome (Loh and Koh *, 2004). (Al-Mashari et al., 2003)

argued that it is important to communicate those goals with the stakeholders prior to implementation. This will help steer the project in the right direction.

2.3.4   Cloud ERP

ERP solutions continue to evolve. They evolved from main frames architectures, to client-server architectures, to web-based applications (Zhao and Kirche, 2013). Recent years have seen cloud computing emerging as a new technology concept that delivers computing services and applications via the internet. The software is hosted on a cloud computing vendor's architecture, from where clients rent it, having access to the software via a browser (Marston et al., 2011). Cloud computing gives users access to a variety of computing resources without having to own them. They only pay a subscription fee (Mauro, 2012). Some of the characteristics of cloud computing are (Mohlameane and Ruxwana, 2014):

- The users of cloud computing access IT resources that are hosted externally for third parties
- These resources are shared with other users
- The IT services are accessed through the internet, usually via a web browser.

Cloud computing helps businesses that have limited IT resources to have access to different business applications offered on a cloud, which can improve their business processes (Zhao and Kirche, 2013). A cloud computing provider runs servers and applications that companies can subscribe and have access to. This helps companies such as SMEs that cannot afford large, on-premises servers— to have access to the same ERP services . It also helps companies with no IT staff to benefit from these services.

Traditional ERP vendors, such as Oracle and SAP, have extended their services by including cloud computing offerings. For example, SAP currently offers SAP Business ByDesign, while Oracle has developed Oracle Small Business Suite, which is delivered via a web browser (Hossain et al., 2002).

With cloud ERP, the license fees are charged according to the software usage, the number of ERP modules subscribed to, and the number of users that use the software (Zhao and Kirche, 2013).

2.3.5   **Cloud ERP in SMEs**

Many studies looked at how cloud ERP is penetrating SMEs as they are the target group for on-demand services (Gerhardter and Ortner, 2013). Even though Gartner (Brodkin, 2008) predicted that SMEs would be willing to adopt cloud ERP, this does not seem to be a universal finding.

For example, a study by Faasen et al. (2013), which explained the perception of SaaS ERP adoption in South Africa, had different findings. It found that despite the identified benefits of cloud ERP, none of the interviewed companies were intending to adopt SaaS ERP. The study discovered several reasons for the reluctance, such as: companies being satisfied with their existing systems, perceived data-security risks, perceived loss of control to the cloud vendors, and limited opportunities of customizing the systems (Faasen et al., 2013).

Similarly, a study by Lechesa et al. (2012) found similar results. The interviewees expressed fear of adopting cloud ERP due to similar reasons, and in addition they expressed concern about network availability, considering that SaaS requires internet connection, which was not guaranteed in South Africa (Lechesa et al., 2012). Another challenge that contributed to the low adoption was the integration of existing in-house applications with SaaS applications. Similar to Lechesa et al. (2012), Faasen et al. (2013) found that many companies were satisfied with the systems that they had in place. This situation was not unique for South Africa. Publication III also found the same results. There was fear that an unstable internet is not ready to accommodate applications that required full-time connection. Another challenge was that there were not many active cloud ERP vendors in the country (Publication III).

Many studies have identified factors that are perceived to have a negative effect on the adoption of cloud ERP. For example, usability limitations and the inflexibility regarding customizing the system . However, as time moves on and the identified challenges are worked out, cloud ERP is an ideal option for SMEs (Hasheela et al., 2016) and therefore needs further research.

3 The Research Problem and Methodology

This chapter discusses the research methodology used in the study. It thoroughly explains the research approach used in this thesis, the research problem, the different research methods used, the data collection, and the data analysis. Figure 3 shows the research process in detail.
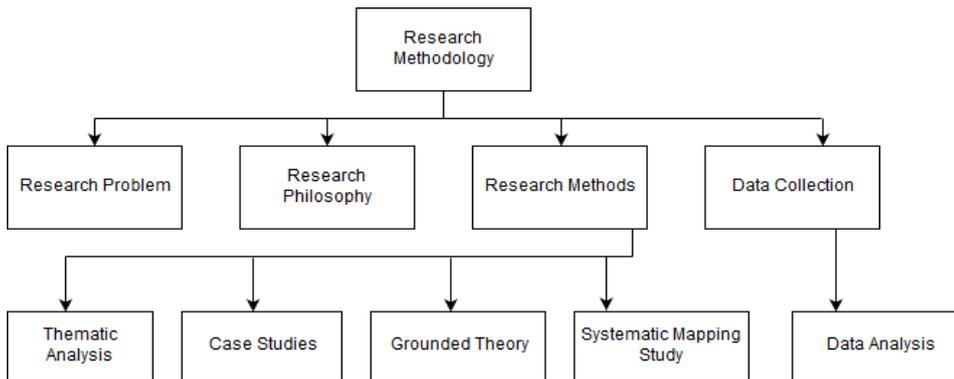
Figure 3: The research process

3.1 The Research Problem

ERP continues to be adopted all around the globe. It is known to improve efficiency, performance, and productivity and it is regarded as a strategic resource by organizations, providing competitive advantage and a strong market position (Law and Ngai, 2007). However it was initially developed for large enterprises. Not only is it a costly and complex exercise, but its architecture was designed for large organizations (Andriole, 2006).

But not all companies adopting ERP are of these characteristics. SMEs in particular are rapidly becoming an economic backbone, and they have been adopting ERP to stay competitive. However based on the background that ERP was developed for organizations with different business structures to those of SMEs, the research objective was identified. The study focuses on SMEs in developing countries in order to understand the issues these organizations face when implementing ERP.

The main aim of the thesis is to contribute to the empirical research of the adoption and implementation of ERP in SMEs in developing countries and to fill the identified research gaps:

Lack of empirical research on Cloud ERP adoption in SMEs

Cloud ERP is perceived to be suitable for SMEs due to several reasons, such as the lesser investment it requires compared to the huge upfront payments required for on-premises ERP. However, the area of cloud ERP in SMEs had not been well studied. The majority of the studies on cloud ERP are done in large enterprises. There is a research gap in this area that needs further research.

Lack of research on the reluctance of Cloud ERP implementation by SMEs in developing countries despite its benefits.

A literature review based on the findings of cloud ERP research gaps identified that cloud ERP is hardly implemented in Southern Africa (Faasen et al., 2013; Lechesa et al., 2012). Companies are reluctant to invest in a new technology. These studies recommended further research into why SMEs in Southern Africa are reluctant to implement cloud ERP despite all its benefits.

Research gaps on challenges that SMEs in developing countries experience when implementing ERP.

Based on the fact that ERP systems were developed in developed countries, initially with the best practices of large organizations, SMEs experience challenges (Hossain et al., 2002; Lewandowski et al., 2013; Xu et al., 2013). There is a research gap regarding the challenges that SMEs in developing countries face when implementing ERP.

A need to understand requirements that SMEs must fulfil in order to have successful ERP implementations.

Due to the challenges experienced by SMEs in developing countries when implementing ERP, there is a need for solutions for these companies so that they can achieve successful implementations. There is a research gap regarding what is required by SMEs in developing countries in order for them to have successful ERP implementations.

3.1.1 **The research questions**

The research questions are derived from the research gaps explained in the previous section. Each publication addresses different research questions that contribute to the main question. The goal of the thesis is to answer the research question:

How can SMEs in developing countries successfully implement ERP?

The research question is decomposed into sub-questions that are answered in different publications:

Publication I: On-premise ERP Organizational Post-implementation Practices – Comparison between Large Enterprises and Small and Medium-Sized Enterprises

1. *How do post-implementation ERP practices differ between LEs and SMEs?*
2. *What causes failure in the post-implementation phase?*

Publication II: What do we know about cloud ERP in SMEs?

1. *What research has been done regarding cloud ERP in SMEs to date?*
2. *What are the research methodologies that have been used in the studies of cloud ERP in SMEs?*
3. *What further research needs to be done in the area of cloud ERP in SMEs?*

Publication III: An investigation of factors leading to the reluctance of SaaS ERP adoption in Namibian SMEs

1. *What are the factors that hinder Namibian SMEs from implementing cloud ERP?*

Publication IV: Challenges of ERP Implementation in SMEs: Empirical Study in Developing Countries

1. *What challenges do SMEs in developing countries experience when implementing ERP?*

Publication V: What are the requirements for a successful ERP in SMEs? Special focus on Southern Africa

1. *What issues do Southern African SMEs experience when implementing ERP?*
2. *What is required for the implementation to be successful?*

3.2 Research Philosophy

We have chosen to carry out a qualitative study for our research. Qualitative studies have become common in the areas of information systems and software engineering (Myers, 1997). The author argues that qualitative studies help researchers to understand the participants' point of view and the cultural contexts in which they live. The qualitative research method was seen as appropriate for our research. In order to be able to answer our research questions, we found it suitable to carry out qualitative methods, such as grounded theory (GT), case study research, and thematic analysis.

(Easterbrook et al., 2008) discussed four different philosophical stances that qualitative research can adopt: positivism, constructivism, critical theory, and pragmatism. Their study emphasized that it is important to describe them as it helps the researcher to be able to defend the methods they use in their research.

Positivism: Studies are carried out by means of experiments or observations that can be referred as trustworthy. The findings have to be quantifiable. There are no human interests in the study, as the researcher might influence the findings.

Constructivism (interpretivism): This focuses on people's view of the world and less on theories. However theories can emerge from the process of researching human activities. In constructivism research, a researcher is not independent from the study, and it is important to rely on their understanding of the situation that is being studied.

Critical theory: This is usually research on existing perceptions about certain practices in order to improve them. Case studies and action research are the main research methods used in this case. Critical theory aims at providing an overview about the research background, criticizing the present status of the studied phenomena, and then improving existing theories.

Pragmatism: The perception of pragmatism is that knowledge is relative to the observer. The pragmatistic perspective sees truth as being reached when a

researcher attends to the practical consequences of ideas. In short, they believe in practical knowledge. Pragmatists prefer to apply mixed research methods when investigating a certain phenomenon, in order to get different views.

Our study falls under the constructive stance because it aims to understand people's views on the situation from within their organizational contexts. According to (Cresswell, 2014), social constructivism aims to seek understanding from individuals in the world where they work and live, in order to understand the social and cultural settings of the participants. The researcher then constructs theories from the data collected from the participants' personal and cultural experiences. Our study is based on the views of employees in organizations and not on our own experiments. We have collected data from different individuals and companies, and derived theories from the data collected. As per the constructivist perspective, the findings cannot be separated from the contexts studied.

3.3   The Research Methods

There are many research methods known to be suitable for information systems, and each one is known to only provide limited evidence about the studied phenomena (Easterbrook et al., 2008). Therefore it is wise to combine multiple methods.

Different methods were used in the different publications that make up the thesis. In Publication I, a case study was conducted. Case studies are useful for in-depth investigation of phenomena. They are especially suitable for evaluating a case, such as an activity, a process, or individuals (Cresswell, 2014; Yin, 1994). (Yin, 2003) explains that a multiple case study helps to analyze data across different situations, and therefore we deemed it appropriate to conduct a multiple case study as we were analyzing activities in different organizations with different characteristics. In addition, grounded theory was used to help build theories from the findings.

During the writing of Publication I, we learned that the crucial reasons behind limited practices in SMEs are related to cost constraints. SMEs have limited funding. They also have limitations such as a lack of a dedicated internal technical team. It is against this background that we decided to look into cloud ERP, which is known to require less costs, as one only needs to pay subscription fees in order to access the services (Lenart, 2011). Therefore, for Publication II, we carried out a systematic mapping study in order to learn about the state of

research on cloud ERP in SMEs. We wanted to identify the type of research that has been carried out in this area.

During the writing of publication II, we learned that even though cloud ERP was suitable for implementation by SMEs, little research had been done in the area. Empirical studies are needed, especially to find out the reasons why many SMEs are not taking advantage of this alternative, efficient ERP. For Publication III, we applied the diffusion of innovation (DoI) (Rogers, 1995) framework, which helps to explain the actions and reasoning of the studied phenomena. The DoI framework was recommended in one of the related studies (Faasen et al., 2013) as it helps to analyze how new innovations spread in communities and how they are adopted. We deemed it suitable to analyze how cloud ERP was being adopted in developing countries.

Publication IV applied a Grounded Theory (GT) methodology, which allows theory development about a certain phenomenon. We wanted to build theories about the challenges of ERP implementation in SMEs in developing countries.

Publication V applied thematic analysis. Thematic analysis is known for analyzing and reporting patterns in the data (Braun and Clarke, 2006). This was suitable for Publication V as we wanted to look for patterns across our data. The used methodologies and how they were used in our studies will be discussed further in the next section.

3.3.1 Case studies

A case study tries to explain why and how something happened. It tries to explain the cause–effect relationship (Easterbrook et al., 2008). Case study research can be conducted using either a single case or multiple cases. A *single case study* simply means it is only one case is studied—it is often used when testing a theory, providing an understanding of a phenomenon (Walsham, 2006). A *multiple case study* refers to studying more than one case. It tries to compare a phenomenon of interest in different settings (Yin, 1994). A case study provides an opportunity for a researcher to observe within an organization, and the researcher can get in-depth information from the participants.

According to Benbasat et al. (1987), a case study methodology is suitable in information systems development and implementation studies because one can collect data using various ways and this will result in diverse research outcomes (Benbasat et al., 1987). Benbasat et al. (1987) identified three strengths of case study research in information systems:

1. A case study allows a researcher to study in a natural environment, allowing them to generate theories from practice.
2. Case study research gives the researcher an opportunity to observe and understand the complexity of the process involved.
3. The researcher can gain valuable insights into the ever-changing information systems field.

(Runeson and Höst, 2009) stated that many research questions in information systems can be answered with the case study method. The nature of research in information systems often focuses on how development, design, and maintenance are handled by software engineers, and a case study is a good approach for seeking answers from individuals or organizations that were part of such developments (Runeson and Höst, 2009).

For this research, a case study was especially suitable for Publication I, which involved the comparison of certain practices in different organizations. A multiple case study was conducted in this case in order to help us compare practices from different cases. The collection of data was done by conducting interviews in the organizations, and a GT methodology was used to analyze the data.

3.3.2 The DoI framework

Usually when new innovation is formed, it takes time for it to take effect in a community because with it comes new ways of thinking and it involves changes that people are not always ready to adopt.

Rogers (1995) deeply studied how new innovations diffuse in society. His study looked at how individuals perceive the innovation characteristics and how these can explain their rate of adoption (Rogers, 1995):

1. Relative advantage: This refers to the degree to which an innovation is perceived to be better than a similar idea that already exists. It basically refers to whether the new idea is more advantageous in comparison to what already exists.
2. Compatibility: This refers to the degree to which individuals perceive a certain innovation to be compatible with their existing values, experiences, and norms. When an innovation is not compatible, it often takes longer to be adopted or it can actually not be adopted at all.

3. Complexity: This refers to the degree of perceived difficulty of a new innovation. The most complicated and difficult innovations will take longer to adopt compared to innovations that are perceived to be easy.
4. Triability: This refers to the degree to which an innovation can be tried/sampled for a certain time before the main installation. Innovation that does not allow a trial before one buys it is less likely to be adopted than an innovation with a trial option. If the former is adopted, the process will be slower.
5. Observability: This refers to the degree in which individuals are able to see the innovation's results. The easier it is possible to see the results, the more likely it is for the innovation to be adopted.

The DoI framework is divided into five steps (Rogers, 1995):
- Knowledge: This is when an individual learns about the innovation
- Persuasion: This is when an individual forms a certain attitude towards the innovation—either negative or positive.
- Decision: This is when an individual takes the initiative to either adopt or not adopt an innovation.
- Implementation: This is when an innovation is put to use.
- Confirmation: This is when an innovation decision is made regarding whether to reverse the innovation implementation or whether to continue making use of it.

This DoI theory was chosen to analyze our findings in Publication III, which deals with the adoption of Cloud ERP. The theory is a suitable theoretical model in studying factors that influence an adoption of a certain technology. It was a suitable theory as it helped us to understand and reason with the respondents as to why they made certain decisions. However diffusion in general is difficult to quantify. The DoI theory concentrates more on the behavior of the individual and ignores external variables. It does not consider the resources of the individual. For example, Cloud ERP implementation mostly depends on the availability of the internet connection, but this could not be explained with the DoI theory. In addition, some of the innovation characteristics identified by the DoI theory had an effect on the Cloud ERP, however some characteristics such as observability and trialibility seemed to have had no effect.

3.3.3   **The grounded theory method**

Barney Glaser and Anselm Strauss developed the grounded theory method (GTM) in 1967. GT refers to developing new theories that are grounded in data, rather than theories that already exist (Glaser and Strauss, 1967). Developing a theory helps a researcher to understand the problem they are studying, and it helps them to understand how study participants deal with it (Glaser and Strauss, 1967). A theory generated by the GTM is usually presented by a diagram, a framework, or a set of hypotheses (Seidel and Urquhart, 2013). The GTM data can be collected from interviews or documents, such as newspapers and observations (Glaser and Strauss, 1967).

The Strauss and Corbin version of GT, known as Straussian GT, consists of a three-code coding process: open coding, axial coding, and selective coding (Strauss & Corbin, 1998). Open coding is the first step in the process of GTM coding. It involves collecting raw data and breaking it down into segments that are easy to interpret (Strauss & Corbin, 1990). It is the foundation technique of the GTM (Seidel and Urquhart, 2013).

The similar concepts that are identified in the data during open coding are grouped together into categories. In axial coding, researchers identify relationships between the different categories created in open coding. The process of axial coding stops when there are no more new relationships that are identified (Strauss and Corbin, 1998). In selective coding, a core category is identified, which relates to all categories. In this stage, categories become saturated and no new open codes emerge (Seidel and Urquhart, 2013).

Concept comparison and theoretical sampling are used to create theory (Eisenhardt, 1989). The choice of conducting a case study and using GT was deemed fit for helping us to achieve our aim of gaining in-depth information from organizations and creating theory.

3.3.4   **Systematic Mapping Studies**

The systematic mapping study (SMS) methodology provides a visual summary of results that have been previously published in a certain research area. It helps to get an overview of a particular research area (Kitchenham, 2004). An SMS aims to identify topics that have been covered in the literature where it has been published. (Petersen et al., 2008) provided a guideline on how an SMS can be conducted. The following is the process they have proposed:

- Define the research questions.
- Conduct a search for primary studies. This is achieved by searching different scientific databases.
- Screen the discovered papers to determine which should be included and which should be excluded. This is achieved by going through papers and selecting the ones that are deemed fit to answer the research questions. Other criteria can also be used to see whether the papers are relevant. Other papers that are identified as irrelevant are then excluded. The abstracts of the selected papers are read. From these, keywords are identified and combined from different papers to form a good level of understanding regarding the research study (Petersen et al., 2008). Thereafter, the relevant papers are placed into categories.
- In the final phase, data from the papers—such as author, publication year, publication venue, etcetera—are extracted from the papers and documented.

This information is then used to come up with a systematic map. The analysis of this information help to present the frequency of publications, which venues are often used for publications, etcetera and gaps that can be filled in future research can be identified (Petersen et al., 2008).

Figure 4 shows the SMS process as proposed by Petersen et al. (2008).
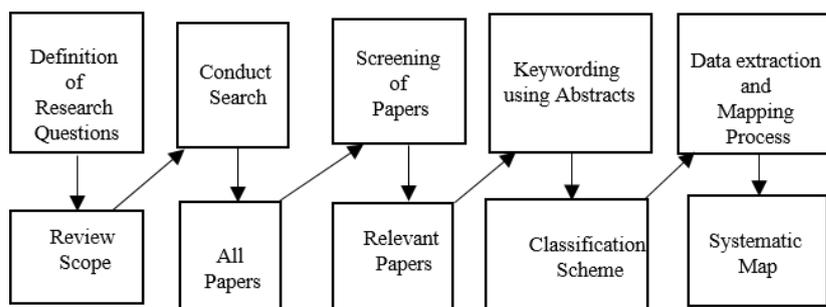
Figure 4: A systematic study process

For this study, an SMS was applied when the need to identify research gaps in the area of cloud ERP in SMEs arose. The researchers felt that this is a new research area that has room for further research. There was therefore a need for

an SMS to identify what has already been done in order to avoid repetition and identify areas that require further research.

3.3.5 Thematic analysis

According to Braun and Clarke (2006), the thematic analysis methodology is a method that can identify, analyze, and report patterns from the data. The aim of using thematic analysis is to look for patterns across a dataset in order to find answers to a research question. The process of pattern seeking involves familiarization with the data, data coding, and theme development. This process is repeated until no more new themes are found.

Brown and Clarke (2006) have prescribed a six-step process for carrying out a thematic analysis. The first step is for the researcher to familiarize themselves with the data by reading it and understanding its meaning. The second step involves identifying codes from the data that the researcher finds meaningful and valuable. After identifying these codes, the third step is to find relationships between the codes and combine them into themes. The fourth step consists of reviewing the themes further in order to see whether there are themes that can be combined, separated, or discarded. The result of this step is a thematic map that results from the final themes identified. In the fifth step the researcher gives the themes names that fit them and then analyzes data within the themes. In the sixth step the researcher interprets his or her analysis and produces a report that has evidence of the themes within the data (Braun and Clarke, 2006).

The thematic analysis allows insightful analysis within empirical data. For example, it allows a researcher to find meaningful information from the data and built patterns within the data according to different themes. In our case, Publication V looked at the requirements needed for successful ERP implementation, and we chose thematic analysis because it allowed us to identify themes under which our identified codes fall and write about our analysis under these themes.

3.4 The Research Process

The research process consisted of three phases. Phase 1 consists of one study (Publication I), which made a comparison between the post-implementation practices that take place in SMEs and LEs. The aim of this paper was to help us understand how organizations of different sizes carry out different practices and

what SMEs can learn from LEs. The study helped us to generate seven hypotheses. The GTM was used to carry out this study.

Phase 2 consisted of two publications (Publication II and Publication III). This phase focused on cloud ERP. The goal of this phase was to understand the current practices of cloud ERP in developing countries. For Publication II, we carried out an SMS in order to learn about what has been researched in the area of cloud ERP in SMEs located in developing countries. This publication gave us the idea for Publication III, which looked at factors that hinder the implementation of cloud ERP in Namibian SMEs. Namibia was chosen as the country of study because that is where the first author was based and thus it was easier to collect data. For Publication III we applied the DoI (Rogers, 1995) perspective, which helped us to understand the DoI in developing countries.

In Phase III, two studies were conducted (Publications IV and V). Publication IV looked at the general challenges that SMEs in developing countries undergo when implementing ERP. We wanted to understand the challenges influenced by the location and condition of organizations in third world countries. The research method used for Publication IV is the GTM. After this publication, the idea for Publication V was born. In Publication V, we looked at what can be perceived as the requirements for a successful ERP implementation for SMEs in developing countries. Thematic analysis was used in Publication V. Figure 5 shows the different phases.
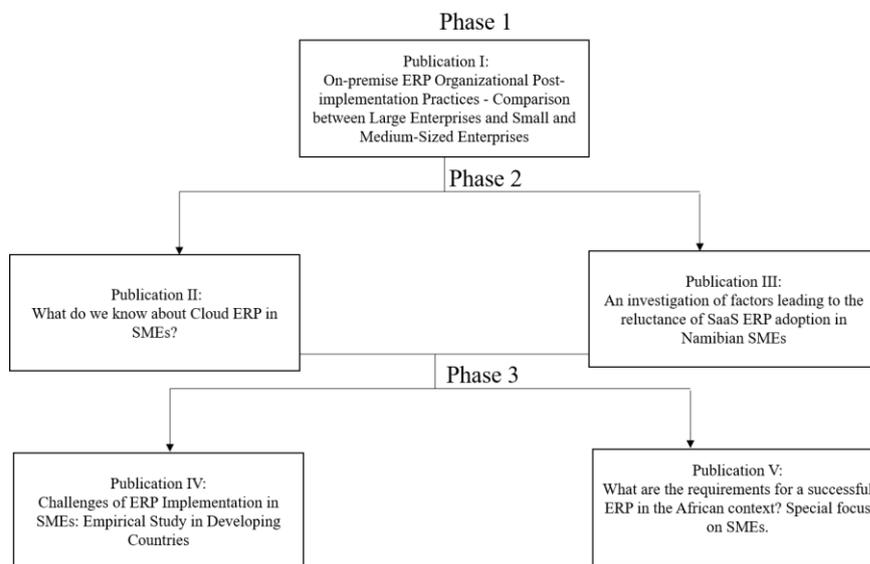
Figure 5: The research process

3.5   Data Collection

Data was collected through several interviews. In total, 49 face-to-face interviews were conducted in 32 companies. The interviews ranged from 40 minutes to one hour. Many of the interviewed companies were small companies as this study focused on SMEs. However three of the interviewed companies were large organizations. This was necessary in Publication I as the study compared and contrasted practices between LEs and SMEs. In addition, a web questionnaire was used to collect extra data from organizations outside the author's reach. Nine questionnaires were answered. The respondents are from South Africa and the Philippines. In addition, 54 interviews were conducted.

In many cases, the sample data was identified from a database of SMEs. After making contact it was determined whether these organizations implemented ERP or not. In the case of Publication III, the initial plan was to collect data from companies that have implemented cloud ERP, however, it was identified that cloud ERP was not implemented yet, therefore the focus changed.

The challenge we experienced during data collection was that many companies were not interested in taking part in the study. Also, since most interviews took place in SMEs, often one could only have interviews with one or two people with valuable information. Information is not shared with many employees. Table 4 shows the number of companies in which interviews took place and the companies' sizes.

3.6   Data Analysis

The data was analyzed with software called Atlas.ti. Atlas.ti makes it easy to analyze data as the data files can be uploaded to the system and one can then sort the data, search it, and code it.

In Phase 1 our collected data was analyzed using GT, which consists of three coding categories: open coding, axial coding, and selective coding. We collected our data from six organizations: three large and three small organizations. This data was used for Publication I.

During our coding process we identified three categories. According to Seaman (2008), it is possible to construct a set of preformed codes if the objectives of the study are clear. In this phase, we initiated our categories from the themes that we used to construct our interview questions. The categories are: *performance and usability, infrastructure management*, and *support and maintenance*. In

axial coding, we looked for relationships between our categories in order to identify our core category. In selective coding, we united our categories into one common category that fits them all, namely *post-implementation practices*. Our analysis extended to a formulation of six hypotheses (Section 4.1.2).

In Phase 2 we carried out a systematic mapping study because we wanted to understand the state of research in the area of cloud ERP. For this study, we selected five scientific databases, which we searched for publications related to this field, and we used the classification scheme for mapping studies recommended by (Petersen et al., 2015). We classified our publications by topic-specific classification, which includes facets such as the research topic, as well as topic-independent classification, which includes facets such as research type and research methods. In total, we identified 17 publications on the area of cloud ERP in SMEs. Based on the results of the SMS we proceeded with Publication III, which resulted from the research gaps that we identified in Publication II. We applied Roger's DoI theory, which looks at how a technology spreads in a firm (Rogers, 1995). In this paper, we categorized our codes based on the DoI categories: individual characteristics, innovation characteristics, and organization characteristics. For example, the codes *lack of knowledge* and *attitude* were categorized under *individual characteristics*.

In Phase 3, the data for Publication IV was analyzed using the GTM. In the open coding phase, interviews were coded line by line, and the codes were grouped into categories that were deemed fit. In axial coding, we compared the categories and established relationships between them. We found categories such as *ERP actors*, which then led to subcategories such as *vendors, users* and *consultants*. Another category, *geographical environment*, covered subcategories such as *infrastructure availability, national issues* and *internet availability*. In selective coding, we selected one core category called *ERP challenges in developing countries*.

In Publication V, we analyzed the data using thematic analysis, whereby we predefined our themes according to the interesting features that we identified in the transcripts. For example, the theme *training* included codes such as: *the unavailability of local training* and *high training costs*.

Table 4: The roles of the interviewees that took part in the research

Company	Country	Company Size (Number of staff)	Participation	Interviewee Roles	Research Phase
1	Namibia	120	Interview	IT Manager	1
1	Namibia	120	Interview	IT Manager	3
1	Namibia	120	Interview	Manager: Systems & software	1
1	Namibia	120	Interview	Manager: Systems & software	2
1	Namibia	120	Interview	Owner	1
2	Namibia	5000	Interview	Business Analyst	1
2	Namibia	5000	Interview	IT Manager	1
3	Namibia	1134	Interview	SAP System Analyst	1
3	Namibia	1134	Interview	ERP Manager	1
4	Namibia	240	Interview	Owner	1
4	Namibia	240	Interview	IT Manager	1
4	Namibia	200	Interview	Owner	1
4	Namibia	200	Interview	IT Manager	2
4	Namibia	200	Interview	Acting ERP Manager	2
4	Namibia	200	Interview	End User	2
4	Namibia	200	Interview	Operational Manager	3
4	Namibia	200	Interview	Operational Manager	1
5	Namibia	1500	Interview	Senior Business Analyst	1
5	Namibia	1500	Interview	Business Analyst	1
6	Namibia	245	Interview	IT Director	2
7	Namibia	178	Interview	Senior Business Analyst	2
8	Namibia	25	Interview	Owner	2
9	Namibia	90	Interview	ICT Manager	2
10	Namibia	60	Interview	CEO	2
11	Namibia	50	Interview	IT Manager	2
11	Namibia	50	Interview	ERP Manager	3
12	Namibia	7	Interview	CEO	2

13	Namibia	18	Interview	IT Manager	2
14	Namibia	150	Interview	Software Development Head	2
14	Namibia	150	Interview	Software Development Head	3
15	Namibia	10	Interview	Owner	2
16	Namibia	65	Interview	CEO	2
17	Namibia	200	Interview	System Analyst	3
17	Namibia	200	Interview	Business Analyst	3
18	Namibia	240	Interview	IT Director	3
19	Namibia	90	Interview	ERP Manager	3
20	Namibia	260	Interview	CEO	3
21	Namibia	14	Interview	IT Manager	3
22	Namibia	150	Interview	Head: Software Development	2
22	Namibia	150	Interview	Head: Software Development	3
23	Namibia	170	Interview	IT Manager	3
24	Namibia	230	Interview	Executive Manager	3
25	Namibia	30	Interview	Principal Engineer	3
26	Namibia	140	Interview	IT Manager	2
26	Namibia	140	Interview	Accountant	2
26	Namibia	140	Interview	General Manager	2
27	Namibia	75	Interview	Business Analyst	2
27	Namibia	75	Interview	Manager: Systems	2
28	Namibia	24	Interview	Manager: Systems & Software	3
29	South Africa	200	Web questionnaire	Owner	3
29	South Africa	200	Web questionnaire	Financial Accountant	3
30	The Philippines	250	Web questionnaire	Head: ICT	3
31	The Philippines	190	Web questionnaire	Programmer	3
32	The Philippines	220	Web questionnaire	Programmer	3

4 Publications overview

This section gives an overview of the publications in this paper (Appendix II). Publications I, II, and IV are conference proceedings, while Publications III and V are journal papers.

4.1 Publication I: On-premise ERP Organizational Post-implementation Practices – Comparison between Large Enterprises and Small and Medium-Sized Enterprises

4.1.1 Research objectives

The objective of this paper was to investigate the organizational post-implementation practices in companies of different sizes and to understand how the issues experienced in these organizations are handled. A multiple case study was carried out in order to learn about how LEs and SMEs operate after going live. The main aim was to help understand the best practices in LEs and learn how SMEs can best learn from them.

4.1.2 Results

The following generalizations were made from the studied organizations:

1. **SMEs seem to value performance evaluation more than LEs**
   Managers in the studied SMEs value performance evaluation, an exercise in which auditors evaluate what was delivered against what was promised and recommend to managers ways to rectify the identified problems. The study observed that this exercise is valued in SMEs more than in LEs.
2. **SMEs use a top-down decision-making approach in their ERP projects, while LEs use the bottom-up approach**
   The studied LEs indicated that they involved different line managers from different departments in their decision making before a final decision is made by management, while the studied SMEs bypass line managers in their decision making. All strategic decision making lies with top management.

3. **Ongoing enhancement positively affects user effectiveness, and LEs seem to invest in ongoing enhancement more than SMEs**
   The paper found that LEs highly invest in functional training and also invest in selected users in order to enable them to be able to train others. However this was not the case for the studied SMEs. The training for the SMEs was mostly given before going live and there was a lack of continuous training, such as e-learning, and this contributed to user resistance to the system.

4. **LEs are more open to out-of-budget resources dedication than SMEs**
   The studied LEs were open to making room to release funds whenever necessary, even when this goes beyond budget. However this cannot be said about SMEs; they try to stick to the budget.

5. **Unlike LEs, which have dedicated internal project management teams, SMEs involve external consultants in requirement decision making, which can have a negative effect on system satisfaction**
   The studied SMEs used consultants for their project management activities, together with temporary internal assembled teams, whereas LEs have internal, dedicated management teams. It was discovered that SMEs often lack internal expertise.

6. **Company size has no effect on the vendor relationship**
   There was no difference among the interviewed organizations regarding their relationship with vendors. They all understand the significance of having a good relationship with vendors and that their licenses have to be up to date in order to make this possible and have access to their support services.

7. **Regardless of the investments made in the ERP systems, all organizations experience some post-implementation issues**
   All the studied organizations admitted to having experienced some sort of issues, such as the unfriendliness of the system and a lack of flexibility.

4.1.3 Relations to the overall research

This case study revealed the different practices that take place in the implementation phase in LEs and SMEs. It revealed that companies of different sizes carry out several practices differently. The study also revealed that SMEs

can learn about several best practices from LEs, such as in-house training, decision-making practices, etc. We got an idea of the challenges that SMEs undergo, such as lack of in-house expertise, and this prompted the idea to investigate the further challenges that SMEs experience when implementing ERP systems. This was how the idea for Publication IV was born.

4.2 Publication II: What do we know about Cloud ERP in SMEs?

4.2.1 Research Objectives

The objective of conducting an SMS is to investigate and identify what has been studied in a certain research area. It categorizes the identified papers, gives a summary of those papers, determines what has been studied, and suggests what needs to be studied. As a result, it provides a map of the state of the art in that specific research area.

The objective of this paper was to investigate what has been researched in the area of cloud ERP and to analyze the identified research in order to identify the topics that have been covered by research and discover gaps that need to be covered by further research. We conducted an SMS in the area of cloud ERP in SMEs. Cloud ERP has been seen as a solution for small businesses (Gerhardter and Ortner, 2013), and the authors were interested to learn how this research area had been studied.

The study asked the following questions:

1. *What research has been done regarding cloud ERP in SMEs to date?*
2. *What are the research methodologies that have been used in the studies of cloud ERP in SMEs?*
3. *What further research needs to be done in the area of cloud ERP in SMEs?*

The three questions guided us in identifying the relevant existing studies, learning how those studies had been carried out, and finding research gaps that exist regarding cloud ERP in SMEs.

4.2.2 **Results**

We identified 17 publications in the research area of cloud ERP in SMEs. We divided them into three categories according to the three phases of the ERP life cycle, namely: the pre-implementation, implementation, and post-implementation phases. The *pre-implementation phase* refers to the phase before the ERP system is deployed in the organization. The *implementation phase* refers to the actual phase in which the system is implemented, whereas the *post-implementation phase* refers to the stage after the system goes live and it is in the hands of the users (Esteves and Pastor, 2001).

It was evident that this research area is understudied. Only a few papers were discovered. The pre-implementation phase had the majority of publications: 11 out of 17 papers fell into this category. The research focus of the identified papers ranged from factors that lead to cloud ERP adoption, benefits/threats analysis before adoption, frameworks for selecting the right cloud ERP package, concerns regarding the adoption of cloud ERP, entry barriers to ERP adoption, and evaluation of cloud ERP systems. The studies were carried out with several research methodologies: literature reviews, case studies, and surveys. The majority of the papers were conducted by reviewing secondary literature.

Only three out of the 17 papers were discovered to fall into the implementation phase. The focus of the papers was on the implementation approach and implementation challenges. One of the papers was completed by reviewing literature, and the other two were case studies. The rest of the papers (3) fell into the post-implementation phase, which focused on the challenges and benefits experienced after implementing cloud ERP. Table 5 shows a summary of the identified papers (Publication II).

Table 5: A summary of the identified papers

Phase	Research Focus	Methodology
Pre-implementation	Concern factors regarding adopting cloud ERP	Literature review + interviews
	Factors determining cloud ERP adoption	Case study
	Benefits/threats analysis	Survey
	A framework for cloud ERP selection	Case study

	The economic concerns of adopting cloud ERP	Survey
	Adoption opportunities and concerns	Literature review + interviews
	Factors contributing to cloud ERP adoption	Survey
	Evaluating cloud ERP	Literature review
	Entry barriers	Field study
	Entry barriers	Literature review
	cloud ERP selection framework	Survey
Implementation	The implementation approach	Literature review
	Implementation challenges	Case study and literature review
		Case study
Post - Implementation	Challenges and benefits of cloud ERP	Literature review
	Challenges of cloud ERP	Survey
	Benefits of cloud ERP	Literature review

The majority of the papers (41%) were literature reviews, and this suggests that further studies should be carried out empirically in order to have first-hand information from SMEs that have implemented cloud ERP systems, as well as to have a perception of the cloud ERP vendors that have implemented ERP systems in SMEs. Generally, the research area lacks sufficient research. It still has room for further studies. Cloud ERP is an interesting new topic that should be further explored.

4.2.3 **The relation to the overall research**

In this study we identified issues and research gaps that need to be filled. For example, we found the need to conduct studies that will help to understand the

cloud ERP vendors' perspective on how they are tackling and working around the identified challenges they face. We have also identified a need for further studies in order to understand the factors that influence the reluctance of SMEs to adopt cloud ERP. This led to further research in which we investigated the factors that hindered some SMEs in developing countries from adopting cloud ERP, despite its benefits and advantages (Publication III).

4.3 Publication III: An investigation of factors leading to the reluctance of SaaS ERP adoption in Namibian SMEs

4.3.1 The research objective

The objective of the paper was to investigate the factors that influence the reluctance to adopt cloud ERP in developing countries. It was conducted in Namibia. It aimed at contributing to the research area of cloud ERP, which is still in its infancy. The study answered the following question: What are the factors that hinder Namibian SMEs from implementing cloud ERP?

4.3.2 Results

The study adopted a DoI framework in order to help us understand why SMEs are delaying the adoption of a new technology that is seemingly beneficial to them. This framework is known to be able to explain the process that takes place between the time a new technology is introduced until it is either adopted or rejected by the community in which it was introduced (Rogers, 1995).

The study identified six hypotheses:

1. **Uncertainty about cloud ERP leads to a negative attitude towards it, which negatively affects the decision to adopt it**
   The study highlighted the fact that when companies feel uncertain about a new technology, they become reluctant to adopt it. Given the fact that cloud computing in general is a new concept in the environment in which the study took place, there was still a lack of trust that affected its adoption among the study participants.
2. **A lack of knowledge about cloud ERP negatively affects its adoption**
   The majority of the interviewed companies had little to no knowledge regarding cloud ERP. However, some indicated willingness to know

more about the systems. The study observed that the lack of knowledge about a technology affects its adoption negatively.

3. **Satisfaction with the existing ERP system has a negative effect on the intention to adopt cloud ERP**

   The interviewed companies that had already adopted ERP systems seemed satisfied with their existing systems, hence they did not seem to be interested in adopting cloud ERP despite its benefits. They seemed content with the systems they already knew.

4. **Perceived incompatibility between the existing on-premises systems and cloud ERP has a negative effect on the decision to adopt ERP**

   The study observed that organizations that implemented ERP had invested a lot in their systems, as well as in the users, and they feared that cloud ERP would not be compatible with the systems in which they had invested. Therefore, based on this background, they did not feel it was worth it investing in a new system if was not compatible with the existing one.

5. **An unreliable internet connection has a negative effect on the decision to adopt cloud ERP**

   Many of the interviewed users expressed concerns regarding technical performance. They expressed concern over the network connection's status in the country as this may affect operations. Many feared that cut-offs may occur due to an unreliable internet connection. Hence we concluded that the perceived unreliability of the technical performance has a negative effect on the decision to adopt cloud ERP.

6. **Data security concerns have a negative effect on the decision to adopt cloud ERP**

   There were also concerns about data security. The fact that data would be in the hands of third-party companies did not sit well with potential cloud ERP adopters as they felt that they would not have control over their data. There were concerns about security and confidentiality.

4.3.3 The relation to the overall research

The aim of the study was to understand the perception of SMEs in developing countries regarding cloud ERP. The preliminary purpose was to understand the factors that lead to the adoption of cloud ERP. However after beginning the

research it was discovered that cloud ERP was not yet adopted by Namibian SMEs. This study was a response to the recommendation for further studies in cloud ERP in different geographical locations (Publication III).

4.4   Publication IV: Challenges of ERP Implementation in SMEs: Empirical Study in Developing Countries

4.4.1   Research objectives

The objective of the study was to identify challenges that SMEs in developing countries undergo when implementing ERP systems. Based on the fact that ERP was originally developed for large organizations in western countries, other types of organization experience several drawbacks (Ahmad and Pinedo Cuenca, 2013). This study looked at these challenges, focusing on SMEs in developing countries. It was mainly done in Namibia, with a questionnaire sent to South Africa and the Philippines.

4.4.2   Results

The study identified several challenges, and they were divided into the different categories into which they fell:

The business environment: The study found that the unreliability of the internet connection was a challenge that leads to disconnection from cloud ERP in developing countries. Some interviewed SMEs also raised complaints about the power cuts that affect their business operations. Another issue was raised regarding the misfit of the system to the companies' business processes. Many interviewed companies also indicated that their systems had to be customized in order to meet the needs of the company, and this came at an additional cost.

Another issue raised concerns the people entrusted to work on the system. Some interviewees expressed that there is lack of knowledgeable people to work on the system in Southern Africa. There is especially a lack of internal capacity, and some companies usually have to outsource their entire ERP projects to external companies. Some stated that there were only a few certified consultants, hence the available ones were very expensive.

Another challenge regarded the requirement specifications. Due to the lack of internal capacity, problems occurred due to the fact that external consultants oversaw the specifications of requirements. For example, some critical

functionalities were not clearly defined, and therefore they were not implemented. The main cause of this was because the requirements were not clearly understood by the consultants. Table 6 summarizes the challenges identified.

Table 6: A summary of challenges of ERP in SMEs

The business environment	- The availability of infrastructure - An unreliable internet connection - An unreliable electricity supply
The ERP system	- High operation cost - A misfit with the original way of doing things - High maintenance of the ERP system
ERP actors	- Users resistance—fear of the system - The high costs of consultants - The lack of understanding by management - The lack of technically skilled staff - The vendors' lack of knowledge - The lack of vendors
Project management	- The absence of internal capacity - Poor time management - Critical functionality is not well defined - The expense of external consultants
Miscellaneous	- System user-unfriendly - Unavailable local training

4.4.3 **The relation to the overall research**

This publication presented the perception of SMEs in developing countries regarding the challenges they experience when they adopt an ERP. After Publication I, where we compared post-implementation practices between SMEs

and LEs, we got some idea of the challenges that SMEs undergo, and we decided to further investigate the challenges in a dedicated research paper.

4.5 Publication V: What are the requirements of a successful implementation?

4.5.1 Research objectives

The objective of the study was to identify what is required in order for SMEs in Southern Africa to have successful implementations of their ERP systems. The study looked into the challenges that companies experience during and after implementation. Then it looked into the causes of these problems and attempted to find solutions to these problems.

4.5.2 Results

Firstly, the study defined different themes into which the problems that were found fell. They are presented in a cause-effect diagram (Figure 6).
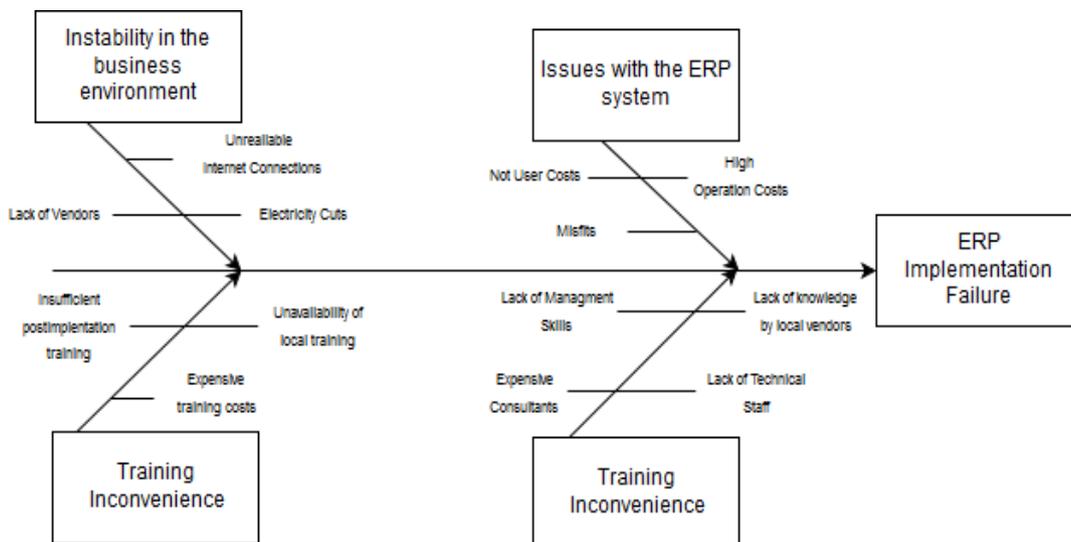

Figure 6: A cause–effect diagram of the ERP implementation challenges in SMEs

Based on the problems that were identified the following requirements were identified:

- **Investment in a reliable internet connection**
  The study found that even though the internet is expensive in Africa (ITU, 2003), companies that are interested in implementing cloud ERP have to be ready to invest in reliable internet connections to avoid work being disrupted.

- **The training of internal trainers in order to reduce the costs of external consultants**
  Publication IV found that training was not available in all countries. For example in Southern Africa, training for SAP and Oracle, which are some of the main implemented ERPs was only available in South Africa. It is therefore costly for companies to send many of their employees to South Africa. Investment in e-learning for the employees to have access to continuous training is recommended.

  ERP vendors such as SAP and Oracle also offer e-learning options. The study recommends that SMEs in developing countries should invest in e-learning so that their employees can have access to instant learning where they can familiarize themselves with processes they may have forgotten. The study also found that training is usually done just after going live, hence it is important to have access to refresher courses in order to help boost the users' confidence in system use.

- **Training for employees according to the roles that they will play**
  The study discovered that the training that users get is not customized to the roles that they play. Users are usually given a wide range of training and information that are not useful to them. The study suggests that training should be customized in order to avoid bombarding users with a lot of information.

- **The involvement of users in the implementation process**
  Our research found that large enterprises involve their users in their implementation process. For example, they include users in meeting discussions, and their meeting minutes are shared with users. This makes users feel less anxious about the system. However in SMEs in developing countries, power is concentrated on top management, as well as the entire decision making process. Users are excluded from implementation

discussions. This increases anxieties and resistance to use the system. Publication V therefore recommends involvement of users.

- **Shortlisted vendors must be required to demonstrate their ERP systems using the client's dataset**
  Shortlisted vendors must be required to demonstrate their ERP systems using the client's dataset. In Publication IV, challenges were reported on misrepresentation of the system by local vendors. The participants expressed dissatisfaction because the systems were presented by vendors who did not have full knowledge of the systems. They also noted that presentations are usually done by third-party vendors and not the original vendors from the original companies. Publication V suggests that in order for organizations to really have a true picture of the system and to ensure its processes match the companies' requirements, the vendors must demonstrate the systems' processes to the stakeholders and be willing to demonstrate all the possible scenarios. This must be done using the implementing organization's dataset.

- **Change management training for managers**
  The results presented in Publication IV show that it is normal for CEOs and the management in organizations to only have a specialization in their line of business. For example, a small engineering company is often headed by an engineer. However, such people do not necessarily have the right skills to lead an organization. A complicated ERP system project needs management to be co-operative and to be open to change. Publication V suggests that the managers of small organizations should undergo change management training when implementing ERP systems.

- **Project management training for a selected number of internal employees**
  Publication IV found that many small companies do not have formal project management in place, and therefore they depended on external consultants to lead or co-manage their ERP projects. In some cases, consultants even oversaw the gathering of their specifications requirements, and this came with high consultation costs. Apart from the costs, the consultants do not always have full knowledge of the implementing companies' needs, nor do they always understand them, hence some organizations discovered missing functionalities that were

not included when going live. Publication V recommends that a few employees must undergo project management training, such as PRINCE, so that they will be able to project manage big projects in their organizations.

4.5.3 The relation to the overall research

The publication presented the requirements for a successful ERP implementation. This research was initiated after Publication IV, which discussed the challenges that SMEs experience in detail. Upon learning about these challenges, a study about how these challenges can be solved followed this publication. It is a combination of a literature review and an empirical study of SMEs owners and employees.

5 The Contributions, Limitations, and Implications of the Thesis

This section presents the contributions of the study, as well as the practical and research implications. Furthermore, it discusses the limitations and the validity of the study. As discussed in Chapter 3, the main question for the thesis is: How can SMEs in developing countries successfully implement ERP? To achieve the objectives of the thesis, nine research questions were formulated and answered in five publications.

5.1 Contributions

The efforts of research in the area of ERP implementations in SMEs have been growing in recent years. However, the literature is still limited. The majority of the literature is concentrated on LEs. There is a need for more understanding of implementations in SMEs and in developing countries.

This study has therefore contributed to the body of knowledge on how companies in developing countries deal with their implementation of ERP systems. The thesis has looked at different practices that take place after implementation. Many of our findings are in agreement with previous findings from related literature. For example, we have found that power concentration is on management in SMEs, which results in decision making lying only with them, sidelining line managers and users whose input could be useful. The top-down approach in SMEs also prevents users from being involved in big projects, such as ERP implementation projects (Mahmood, 2014). This leads to users resisting the system when it comes into use. This finding is similar to the findings of several researchers who argue that not involving users in a project that concerns them results in user resistance (Garg and Agarwal, 2014; Venugopal and Rao, 2011).

The study has looked at how SMEs can learn from LEs in their organizational practices in order to have successful implementations. For example, involving employees in the requirement specification processes instead of entirely relying on external consultants. Based on our research, we found that SMEs outsource their IT projects to external consultants that might not understand all the requirements of the organizations, which may result in companies ending up with dissatisfactory systems. While the topic of external consultants' risks is not new, several studies (Ahmad and Pinedo Cuenca, 2013; Garg and Agarwal, 2014; Nah et al., 2001; Wong et al., 2005) have looked at it from the perspective

of the high costs they bring. Publication IV highlighted the risks related to trusting third parties with delivering a satisfactory system when they may not fully understand the processes and the requirements of the organization.

Several studies have carried out SMSs in the area of ERP in SMEs (Haddara and Zach, 2011; Moon, 2007; Ruivo et al., 2013). However, there was no SMS that specifically looked into cloud ERP. Therefore we conducted a cloud ERP SMS.

In relation to cloud ERP, the study has also contributed to the body of knowledge regarding the state of cloud ERP adoption in Southern Africa. In addition to the two studies by (Lechesa et al., 2012) and (Faasen et al., 2013) that looked at barriers affecting cloud ERP adoption in South Africa, Publication III looked at factors that lead to the reluctance to adopt cloud ERP in Namibia. The findings of the studies done in South Africa are very similar to the findings of Publication III. The internet connection was the main concern because it seems to be unreliable with disconnections at times. The findings in both countries are the same. The findings are also similar to the findings of (Lewandowski et al., 2013).

The study also presented several challenges that SMEs in developing countries experience before and after implementing ERP (Publication IV). One of the main challenges the study found is that, since these systems were designed with the best practices of the companies in the countries in which they were designed, misfits are common in other countries, such as Namibia. The processes are not the same and usually require further expensive customization. (Hawari and Heeks, 2010) also argue that a gap exists between systems built-in capacity and other organizations' realities. The study further looked at possible solutions for these challenges (Publication V). Table 7 summarizes the contributions of the thesis.

Table 7: A summary of study contributions towards the body of knowledge on ERP in developing countries

Problems	Contributions
Research gaps in the literature of cloud ERP in SMEs	This research provided an insight into the state of the art of cloud ERP adoption in SMEs. The study showed that even though cloud ERP was perceived to be suitable for SMEs, it

	is not yet adopted to the extent it ought to be.
Lack of empirical research on why SMEs in Southern Africa are reluctant to implement Cloud ERP despite all its benefits.	The study contributed to the research gap by developing a framework of factors that affect cloud ERP adoption in SMES. This framework contributed to the research gap by identifying several factors that lead to the reluctance of SMEs to adopt cloud ERP in developing countries. The factors identified can be used by practitioners to understand the challenges of developing countries in relation to SaaS services.
Research gaps on challenges that SMEs in developing countries experience when implementing ERP.	The study presented several challenges that SMEs in developing countries go through when implementing ERP. These challenges can be used by ERP developers to develop systems suitable for these SMEs. They can also be referred to by researchers in future research to help find further solutions to these challenges.
A need to understand requirements that SMEs must fulfil in order to have successful ERP implementations	The study identified several requirements that SMEs in Southern Africa must fulfill in order to have successful ERP implementations. The results will be beneficial to SMEs that are planning to implement ERP systems, as well as those that have already done so but are experiencing challenges.

5.2   **The implications of the research**

This section presents the theoretical and practical implications of the research. Firstly, the theoretical implications are presented, followed by practical implications.

5.2.1   **Implications for further research**

The study has looked at different organizational activities that take place after the implementation of ERP, differentiating between large and small organizations.

The first implication is that even though cloud ERP is ideal for small organizations, it is not well studied in developing countries. Best practices need to be investigated further.

The second implication is that ERP adoption research is approached from the implementing organizations' perspective in this study in order to learn about the challenges they face. However, there is a need for further research from the vendors' point of view regarding the challenges that they experience in developing countries so that this is also understood.

The third implication is the need to carry out research that differentiates between small organizations and medium-sized organizations. Many of our studies took place in medium-sized organizations. These companies have IT employees. However, small companies (with less than 50 employees) hardly have any IT employees. There is a need for further research that look at small enterprises and medium-sized enterprises as two different entities.

The fourth implication is the need for a study focusing on implementing open-source ERP in developing countries. This study has only looked at the commercial ERP systems that SMEs can make use of. Most of the challenges that SMEs experience are cost related. There is a need to look at the challenges and benefits of implementing open-source ERP in developing countries. There is also a need for an SMS in this research area.

The fifth implication is the testing of the suggested requirements detailed in Publication V. Publication IV investigated the challenges that SMEs in developing countries undergo, and Publication V suggested solutions for these challenges. There is a need to study and test these requirements in organizations in the future.

5.2.2   **Practical implications**

This section presents the implications for practitioners such as the owners and managers of SMEs that plan to implement ERP, as well as ERP vendors that would like to implement their systems in developing countries:

In-house training is necessary
The thesis argues that SMEs need to invest in in-house training because it is known to help avoid anxiety and boost confidence in using the system. It will also help avoid incurring the high costs of sending new employees for training, for example, in Southern Africa (where the only place where training in the major ERP systems is available is South Africa).

The top-down approach to decision making lacks transparency
The study observes that SMEs use the top-down approach in decision making, whereby the concentration of power lies within top management. Even communication regarding projects is kept at management level. End users should be involved in the implementation process as they often have first-hand information about the business processes, unlike management. This should result in more satisfactory systems.

Cloud ERP service providers should avail their services to the emerging markets
Many SMEs in developing countries seem to be unaware of cloud ERP. It is important that cloud ERP providers market their business in developing countries and make their existence known. Cloud computing is generally not well known in developing countries, which is why it has not really penetrated into the emerging markets. There is really a need for cloud computing service providers to make their services available. Considering that there is reported unreliable internet connection in developing areas that hinders the adoption of cloud ERP, the study suggested that the international companies that offer cloud ERP should venture with local companies to provide a package of affordable, reliable internet together with cloud ERP services.

Developers must do feasibility studies in several other regions in order to understand their cultures and requirements
ERP systems developers usually develop systems using the best practices of companies immediate to them, without considering other cultures and the business environments of other companies that may purchase the systems as well. In addition, the systems usually cater for specific markets and are not

always flexible enough to accommodate different industries and companies of different sizes. As a result, companies, especially those in developing countries, experience challenges when using these systems. It is important that developers do a feasible study in several regions in order to understand their cultures and requirements.

Finally, software engineers in developing countries should also start developing their own ERP systems that suit their needs.

5.2.3 Threats to the validity of the research

All research designs are subject to bias, which can affect the validity of the research. This section discusses the validity of the research. The research bias can either be investigator (researcher) bias or subject bias. Research bias can be caused by the researcher's personal beliefs, incompetence, lack of experience, stereotypes, etc. while subject bias can be caused by factors such as the behavior of the respondents and resistance (Wolf, 1987). Also, the research questions can have an influence on the validity. If the used design is not appropriate, it may not produce useful data.

In this study, we have evaluated our research against descriptive validity, interpretive validity, theoretical validity, generalizability, and evaluative validity (Maxwell, 1992).

Descriptive validity refers to the factual accuracy of the research, whether or not the researcher make up or modified the data. In our study, to avoid misinterpreting the participants, we recorded the data while they were speaking, instead of writing it down right away. The data was recorded with a smart phone recorder. Some of the recordings that were made in a local language were translated into English, then transcribed. Also, during the translation, the researcher tried by all means to keep the same meaning as much as possible and not change it to what she saw as fitting. This study also used several research methodologies, which helped us to facilitate a deeper understanding of our studied phenomenon. In addition, the study was not a one-researcher work—the interviews were double-checked by several people, and, in addition to that, the questions were open-ended, leaving it up to the respondents to answer as they saw fit. We also tried not to lead them on, but rather to let them express their opinions. The data was also not collected from one organization only, but from several organizations. We also gathered secondary data from literature, which was done in related studies.

Interpretive validity refers to the degree to which the researcher understood the viewpoints, intentions, and thoughts of the participants, whether the phenomena are really constructed from the participants' perspective, and whether they are really grounded in the language of the people studied (Maxwell, 2005).

In our study, after we transcribed the data, we thoroughly analyzed it and obtained our hypothesis and theories directly from it. For example, in Publication I, we derived seven hypotheses from the data. As mentioned, the data collected had been recorded, and all the concepts and theories formed are extracted from them.

Theoretical validity refers to the degree to which theoretical explanations that are derived from a study fit the data (Maxwell, 2005). It refers to the validity of the theories created from the data and seeks to evaluate the validity of the concepts and the relationships between the concepts as theorized by the researcher. The researcher should be able to produce data that supports his or her theory (Auberbach and Silverstein, 2003).

In our study, we included quotes from the data as evidence of what exactly was said by the study participants and to give evidence of where the constructed hypotheses emerged from. In addition, we have taken the reviewers' feedback about our constructs into account and addressed them.

In Phase I, where we investigated post-implementation practices, the criterion that we used for selecting the interviewed companies was that the companies must have implemented ERP at least two years before. According to (Velcu, 2007), a company only realizes benefits after two years of implementation.

Generalizability refers to the extent to which the findings of the study in one situation or environment can be generalized to other populations or situations (Maxwell, 2005). One of the points of concern about validity here is the fact that the majority of our data was collected in one country, with only minor data collected from two other developing countries (South Africa and the Philippines). However, based on the review of literature that we have done on SMEs, developing countries often have similar characteristics. This is evident from the points of view from the minor data received from two other countries. Lee and Baskerville (2003) argued that even though the results of a qualitative study cannot be generalized over a population, there is a different generalization that can be made from data to theory. Similarly, the findings in our study can be theoretically generalized.

Furthermore, it is common knowledge that qualitative studies are not designed to be generalized outside their study settings. However, creating theories from a qualitative study can be useful in other settings (Lee and Baskerville, 2003).

Evaluative validity refers to the evaluation of the study by the researcher against its validity. Maxwell (1992) argued that it is difficult to evaluate qualitative research. There was no evaluation done on the study by the researcher. However, the publications included in the study are peer-reviewed by the scientific reviewers who have done the evaluation on the research.

5.2.4 Limitations

There are some limitations to our study. The first limitation is that the data that we collected are only from the ERP clients' perspective. This is a limitation because the vendor's perspective can also help us understand the challenges that they undergo when dealing with small business clients, as well as what they perceive as the requirements of a successful implementation, among other things. The vendors' perspective was left out because we did not have access to vendors. It is against this background that future studies should include the vendors' perspective in understanding the adoption of ERP in SMEs.

Another limitation is that the study did not distinguish between the small enterprises and medium-sized enterprises. We have only looked at SMEs in general.

The study also suggests further observations in more companies would be a good idea, even though this study explored SMEs in developing countries. The data was only collected from Namibia, South Africa, and the Philippines. It would also be helpful to have studies done separately on the BRICS countries (Brazil, Russia, India, China, and South Africa), which are also developing countries but are known to be advanced emerging economics. Therefore they are more advantaged than other developing countries economically.

6 Conclusion

This thesis utilized empirical research methodologies to understand the adoption and implementation of ERP systems in SMEs, with a special focus of developing countries. This chapter summarizes the research contributions and suggests ideas for future research.

6.1 Contribution

The study is made up of three phases. The first phase studied the different practices of SMEs after ERP implementation, which were compared to the practices of large organizations. The second phase studied the implementation of cloud ERP in SMEs. Firstly, a systematic mapping study was done, to help understand the state of art in this research area. After the mapping study, we looked at factors that negatively affect cloud ERP implementation in SMEs. In the third phase, the challenges of implementing ERP were investigated and how they can be solved was considered.

The following list summarizes the findings:

SME decision making and power concentration

- SMEs use a top-down decision-making approach in their ERP projects, but the bottom-up approach is advisable.
- SMEs rarely have internal project management teams, which leads them to outsource their whole ERP project to external consultants, which in turn can lead to unsatisfactory results.
- Power in SMEs is often concentrated with management, and the characteristics of the manager of the company play a role in the decisions to be made regarding ERP in an organization.
- LEs often involve employees from the beginning of projects, but SMEs often keep the communication at the management level, seldom involving users in any planning or meeting discussions.

Wang (2016) also found that SMEs usually have informal business structures and lack of experience among managers. The study also found that SMES in

developing countries have cultures that allow top management to make all the major decisions.

Absence of first-hand and knowledgeable vendors

- Due to the absence of first-hand vendors, there is lack of training in many developing countries, especially those in Southern Africa. ERP vendors need to consider partnering with local IT companies to provide training locally.
- There is a lack of knowledgeable ERP vendors in third world countries. It was expressed that some vendors' representatives do not have full knowledge of the systems and thus the products have been misrepresented.

These findings are in line with the findings of Rajapakse and Seddon (2005), that states that local ERP agents are not always able to provide support about ERP systems due to lack of knowledge.

Training

- Ongoing enhancement within an organization increases user effectiveness, improves user confidence, and decreases users' anxiety.
- A lack of training leads to a lack of motivation and user resistance to using the system.

Wang (2016) also found the same results. The study found that consultants in developing countries often have limited knowledge that result in poor training.

Costs

- SMEs have limited funding, which leads them to having limited budget resources dedicated to their ERP projects.
- Many challenges experienced in SMEs are related to costs because SMEs usually lack financial resources and therefore they are very careful when it comes to spending. SMEs try to stick to budget as much as possible, unlike LEs that make funds available for extra costs that may arise.

These findings are in agreement with the findings of Pissarides (1999), Brown and Nasuti (2005) and EIB (2011). These studies all found that SMEs in developing countries hardly have sufficient turnover to afford ERP implementation and maintenance.

Cloud ERP

- The topic of cloud ERP in SMEs is understudied, especially in the post-implementation phase. The most covered topics relate to the pre-implementation phase, such as the factors that lead to the adoption of cloud ERP.
- Most of the studies on cloud ERP are based on literature reviews. There is a need for more empirical studies in this area.
- Unreliable internet connections lead to a disruption of SaaS, which affects the adoption of cloud ERP in countries with unreliable internet services.
- Uncertainty about cloud ERP negatively affects its adoption.
- There is a negative effect when implementing cloud ERP when an organization is satisfied with its existing ERP system.
- When a company perceives that cloud ERP will be incompatible with its existing on-premises systems, it will have a negative attitude towards it.

A study by Lechesa et al. (2012) also expressed concern about network availability as one of the core reasons why SMEs in South Africa fear adopting Cloud ERP. Similarly, Lechesa et al. (2012) and Faansen et al. (2013) found that companies that are satisfied with their already existing systems hardly have an interest in investing in Cloud ERP.

Misfits

Companies usually experience misfits between their business processes and the ERP system. There is a gap between the built-in capacity and the requirements of the system, and the organization realities. These findings confirm the findings of Hawari and Heeks (2010) that misfits are likely to happen in some organizations because systems cannot be one size fits all.

Requirements

- The requirements of a successful ERP implementation in SMEs in developing countries include:
  - o Invest in a reliable internet connection
  - o Train internal trainers to reduce the costs of external consultants
  - o Invest in e-learning for employees to have access to continuous training
  - o Train employees according to the roles they play
  - o Involve users in the implementation process
  - o Shortlisted vendors must be required to demonstrate their ERP systems using the client's dataset
  - o Train managers in change management
  - o Train a selected number of internal employees in project management

The points above can guide both the researchers that would like to like to do further research in the area and SMEs that would like to implement ERP, as well as ERP practitioners.

6.2   Future research

There are several future topics that arise from this research. For example, cloud computing services can be hosted outside one's country. It would be interesting to learn about the impact of government policies on cloud computing and how they can affect the implementation of cloud ERP.

This study was entirely based on the customers' perspective. Another future research topic could be the vendors' perspective on the challenges of implementing ERP in SMEs.

Also, this study was conducted in Namibia, South Africa, and the Philippines. It would be interesting to conduct a similar study with data collected from a different continent, such as South America.

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Publication II

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Publication III

Hasheela-Mufeti, V., Smolander K, and Mufeti, K.
An investigation of factors leading to the reluctance of SaaS ERP adoption in Namibian SMEs. *The African Journal of Information Systems*: **Vol. 8 , Iss. 4, Article 1**

Publication IV

Publication V

Appendix I: Cover letter

Dear Sir/Madam,

I am doing research about SaaS ERP in Namibia, and I would like to get opinions from companies that have implemented this, to find out how they perceive the systems, and those that have not implemented it to find out why they have not. It is for my Doctorate study at Lappeenranta University of Technology.

It is my sincere hope that you will allow me to come and have an interview with you.

However if it is not possible at all, I will be happy if you can fill one of the questionnaires. below.

One is for companies that have implemented Cloud ERP, here is the link:

 https://docs.google.com/forms/d/1QAMlU8yILC4VOinFDOSoTC5Pw0XiopZDPRSnZtr0w zw/viewform

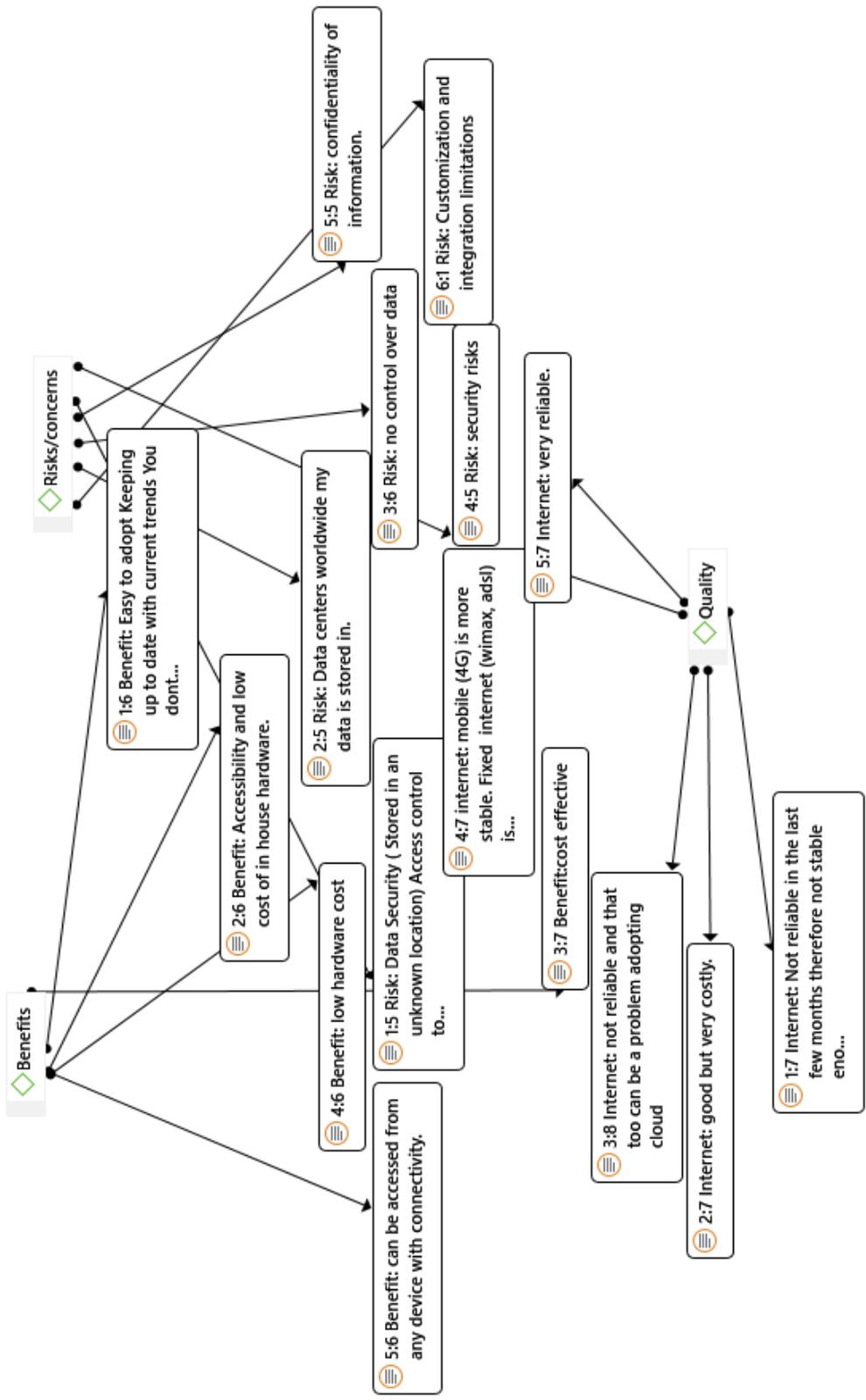This one is for companies that have not implemented Cloud ERP, here is the link:

 https://docs.google.com/forms/d/1kvvU_cRDryeOpo7hs49l843lq5SvRFcDGrBOi19G2FM/v iewform

Thank you very much for making time. Please know that your participation will be anonymous and the information will be confidential. I look forward to hearing from you.

Yours Sincerely,

Victoria

Appendix II: Example of a network diagram created from Atlas.ti

Risks/concerns

- 5:5 Risk: confidentiality of information.
- 6:1 Risk: Customization and integration limitations
- 1:6 Benefit: Easy to adopt Keeping up to date with current trends You dont...
- 3:6 Risk: no control over data
- 4:5 Risk: security risks
- 2:5 Risk: Data centers worldwide my data is stored in.
- 5:7 Internet: very reliable.

Benefits

- 2:6 Benefit: Accessibility and low cost of in house hardware.
- 4:6 Benefit: low hardware cost
- 1:5 Risk: Data Security (Stored in an unknown location) Access control to...
- 4:7 internet: mobile (4G) is more stable. Fixed internet (wimax, adsl) is...
- 3:7 Benefit:cost effective
- 5:6 Benefit: can be accessed from any device with connectivity.

Quality

- 3:8 Internet: not reliable and that too can be a problem adopting cloud
- 2:7 Internet: good but very costly.
- 1:7 Internet: Not reliable in the last few months therefore not stable eno...

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