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The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency

by

Nompumelelo Zuma

Student Number 4177460

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Supervisor: Dr Ntandoyenkosi Sibindi

DECLARATION

I, **Nompumelelo Zuma,** confirm that this thesis titled "The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency" is my own, unaided work (except for the referenced portions). All the sources that were used have been included in the reference list and this study has not been previously submitted by me at another University for any degree fulfilment. It is being submitted for the PhD in Business Management at the University of the Western Cape.

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ABSTRACT

Organisations are investing significant capital in information systems that facilitate remote work and cloud networking. The preferred system is one that provides an organisation with all the tools required for information resource management. Of the available systems, the enterprise resource planning (ERP) system is the most commonly implemented system due to its advanced features that surpass those of other systems in the market. An organisation must leverage its rich tapestry of knowledge to better implement the ERP. Knowledge management (KM) is the backbone of modern technology adoption, providing managers with the information necessary to customise the ERP to meet organisational needs. Public sector organisations in South Africa are striving to implement ERP to provide a comprehensive solution to information management problems. Despite its advantages, the ERP system takes an average of four years to implement, depending on an organisation's size, and requires millions of Rands for customisation and add-ons. Against this backdrop, this research study examined the relationship between KM and ERP, with a focus on the National Youth Development Agency (NYDA), a public sector organisation that recently adopted ERP. The study employed mixed method data collection, including questionnaires and interviews with NYDA staff members. At the time of the ERP system's go-live, issues such as alignment with organisational processes and strategy, features, and user training remained critical. The system was not fully utilised by all subdivisions, leading to significant operational challenges. Employees were not enthusiastic about the new system and resisted its implementation and use due to their lack of involvement in any stage other than implementation. These challenges underscore the importance of sharing and transferring information to all parties involved, particularly system users, for any organisation looking to implement the ERP. End-users must work closely with implementers, as they are in a better position to understand an organisation's processes, services, client needs, and preferred service delivery.

Keywords: Enterprise Resource Planning, Knowledge Management, Public Sector Organisation

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LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average Variance Extracted
BA	Business Analytics
BI	Business Intelligence
BPM	Business Process Management
BPR	Business Process Re-engineering
CDC	Conference on Decision and Control
CEO	Chief Executive Officer
CRM	Customer Relations Management
CSF	Critical Success Factors
ERP	Enterprise Resource Planning
FIFO	First-in, first-out
GA	Genetic algorithm
HRM	Human Resources Management
IBS	Industrialized building system
ICACSIS	International Conference on Advanced Computer Science and Information Systems
ICAI	International Conference Automatics and Informatics
ICASSP	International Conference on Acoustics, Speech, and Signal Processing
ICIEA	International Conference on Industrial Engineering and Applications
IIT	Innovations in Information Technology
IS	Information System
IT	Information Technology
IYDS	Integrated Youth Development Strategy
KM	Knowledge Management
KME	Knowledge Management Effectiveness

KPI	Key Performance Indicators
LIFO	Last-in, first-out
MMR	Mixed methods research
MRP II	Manufacturing Resources Planning
MRP	Material Requirements Planning
NYDA	National Youth Development Agency
OSS	Open-Source Software
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
PLM	Product lifecycle management
POPI	Protection of Personal Information
ROI	Return on Investment
RQ	Research Question
SaaS	Software as a Service
SAP	Systems Analysis Program
SAPS	South African Police Service
SCM	Supply Chain Management
SME	Small and Medium Enterprises
SMME	Small Medium Macro Enterprises
SPSS	Statistical Package for the Social Sciences
TA	Thematic Analysis
VIF	Variance Inflation Factor
VMV	Vision, Mission, and Values
WSC	Winter Simulation Conference

CHAPTER ONE: INTRODUCTION AND BACKGROUND OF THE STUDY

1. Introduction

To succeed in advanced markets, organisations need to integrate their business functions into a single system and store their data in a cloud network. This solution is called the enterprise resource planning (ERP) system, which leverages advanced information technology solutions to allow organisations to share their data and information with internal and external stakeholders (Jayawickrama et al., 2019). The primary function of the ERP system is to ensure that all business functions work together flawlessly and uninterrupted to enable various subdivisions of the organisation to share information on a cloud network.

To manage its assets effectively, an organisation needs to integrate knowledge management (KM) and ERP. Previous studies (Andreeva & Kianto, 2012; Jeng & Dunk, 2013) have not explicitly acknowledged the theoretical perspective on the relationship between KM and ERP that emphasises their successes and failures. Trivedi and Srivastava (2022) recognise the practical importance of consistent knowledge management, which enables organisations to offer eGovernment and continuously deliver services to the communities. It should be considered that KM systems are not successful when the process flow of KM is not followed correctly, or when the internet integration through systems such as ERP is not done properly.

The integration of KM and ERP changes how the Information Technology (IT) system users, such as employees and stakeholders, utilise digitised knowledge to be more productive in an organisation (Jasimuddin & Naqshbandi, 2019). This process flow is possible through the implementation of mediating variables such as knowledge transfer, staff morale, change management, business process re-engineering, and organisational performance improvement. The literature extensively explains these variables' role in the successful implementation of ERP using knowledge management. The ERP system is the backbone of an organisation that ensures its functionality is fully digitalised and effective at all costs (Trivedi & Srivastava, 2022). Therefore, the system implementers need to manage and involve end-users from the initiation stage to avoid resistance during its implementation and usage.

This chapter presents the background and context of the study, the problem statement, research questions, objectives, research gap, significance of the study, and an overview of the chapters. Finally, the chapter ends with a summary.

1.1 Background of study

The contemporary technological environment necessitates public sector organisations to ensure the delivery of quality services by consolidating all operations into a digital system and institutionalising knowledge management (Thirunavukkarasu et al., 2022). However, previous studies on the implementation of KM and ERP systems (Agrawal & Mukti, 2020; Ma'arif et al., 2019; Samiei & Habibi, 2020; Yahya & Khalefa, 2021) have mostly focused on generic approaches and alignment frameworks primarily directed at the private sector. As a result, a significant gap exists in the literature regarding the alignment of KM and ERP implementation in public sector organisations, particularly in African contexts where there is a growing interest in adopting ERP systems.

Despite two decades of research in this area, organisations still face challenges in aligning their business strategies with KM and ERP implementation (Samiei & Habibi, 2020), while the scarcity of literature on this topic remains a persistent concern.

1.2 Context of study

The National Youth Development Agency (NYDA) is a government agency established to address challenges faced by the nation's youth (Department of Women, Youth and People with Disabilities, n.d.). The agency is responsible for addressing youth development issues at the national, provincial, and local government levels and reports to the Presidency in the Republic of South Africa. NYDA was established in 2008 through an Act of Parliament, and its mandate is derived from the National Youth Development Agency Act, 2008 (Act 54 of 2008), the National Development Plan 2030, the National Youth Policy 2030, and the draft Integrated Youth Development Strategy (IYDS) (National Youth Development Agency, 2021). The agency is a merger of the National Youth Commission and the Umsobomvu Youth Fund, and it provides a single, unitary structure to address youth development issues.

South Africa, like developing countries, has a large youth population facing socio-economic challenges such as poverty, inequality, and joblessness. Youth encounter the biggest brunt of

these challenges, and it requires a multi-pronged effort to promote sustainable livelihoods, reduce poverty and inequality, and create an enabling environment for youth development. Given the importance of youth development, the NYDA plays a leading role in ensuring that key stakeholders prioritise youth development and identify and implement long-term solutions to youth development challenges. The agency designs and implements programmes aimed at improving the lives of young people and providing opportunities for them. These programmes are grouped into individual, community, and provincial/national levels (National Youth Development Agency, 2021).

At the individual (micro) level, NYDA provides direct services such as information provision, career guidance services, mentorship, skills development and training, entrepreneurial development and support, health awareness programmes, and involvement in sports. At the community level (meso), NYDA encourages young people to be catalysts for change in their communities through engagement in community development activities, social cohesion initiatives, national youth service programmes, and social dialogue. At the provincial and national (macro) level, NYDA facilitates the participation of youth in policy development, partnerships, and research programmes that shape South Africa's socio-economic landscape.

The NYDA's efforts towards youth development are commendable, and it is vital that stakeholders continue to prioritise youth development and implement long-term solutions to address the challenges facing the nation's youth (National Youth Development Agency, 2021).

1.3 Problem statement

The NYDA of South Africa has been facing audit findings regarding products delivered to clients, which were either incomplete or had omitted critical steps in the process flow, as well as difficulties in integrating its programmes over the past years. As a youth agency, the NYDA has identified the need to become a pioneer of a paperless government agency in order to speed up service delivery to the youth of South Africa and enable them to track their applications until delivery.

To achieve this goal, the NYDA saw the need to automate its business processes for operational efficiency and effectiveness in this ever-changing technological world of business. Currently, all business processes are running manually and separately, and the flow of information is slow, making it difficult to respond to complaints and queries from clients, leading to further complaints by young people and stakeholders. This situation is the primary cause of delays in

decision-making and a compelling reason to adopt an ERP system. By automating its processes, the NYDA hopes to maintain organisational effectiveness and relevance in the technological environment.

The NYDA is an ideal public sector organisation to conduct this study with since the system has not yet fully taken off due to KM application difficulties. The researcher aims to study the reasons behind KM and ERP integration difficulties in the organisation and how the system itself would help the organisation when applied using the correct KM. The survey and interview questions aim to investigate the challenges experienced by the vendor and end-users of an organisation while retrieving KM variables to help build the tailor-made ERP. The study also investigates the expected date the system can be operationalised. It is crucial to examine whether knowledge has ever been preserved in the organisation, shared with employees, and a proper informative session planned, as well as training before the adoption of ERP.

The NYDA's executive directors and board of directors made the decision to adopt the ERP system in November 2018 with the hope of eliminating most errors with their current systems while fast-tracking service delivery. Their priority was to be able to store data in a cloud network and make payments to service providers on time while working on an integrated single system for all its programmes. However, to date, the system has not been fully utilised, and the organisation is still stuck with manual processes that use more paper. More than one system is in place, with each sub-department using its policies and procedures for its activities.

1.4 Research questions and objectives

The research will be conducted based on the knowledge-based view of the organisation and the context as the main conceptual framework to thoroughly interpret the relationship between independent, mediating, and dependent variables presented by the hypothesis and answer the research questions. This study will also investigate the mediating variables such as staff morale, knowledge transfer, business process re-engineering, organisational performance improvement, and change management that public sector organisations should deploy when implementing the ERP using KM to match their business strategy. The objectives of this study are:

a) To determine the role that knowledge management and knowledge transfer play in supporting the implementation of ERP systems in an organisation.

b) To ensure that organisations are aware of and maintain positive staff morale during the ERP system implementation and prevent employees' reluctance to change.
c) To prepare organisations for change management adjustments on their operations post-ERP implementation.
d) To address the influence that the KM has on business process re-engineering during the ERP system implementation.

1.4.1 Research questions

To achieve the above objectives, this study will answer the following research questions:

a) What role can knowledge management and knowledge transfer play in supporting the implementation of an ERP system in an organisation?
b) How can organisations ensure there is positive staff morale during the ERP system implementation and prevent employees' reluctance to change?
c) How can organisations implement an ERP that is well-planned to absorb the changes in the management of an organisation's operations?
d) How is the business process re-engineering influenced by the KM during the ERP system implementation?

1.5 Research gap

Numerous studies have investigated the implementation of ERP systems in organisations, including the reasons why many organisations fail to implement the system despite its market demand and the development of various philosophies to suit different organisational needs (Haddara, 2018). According to Rouhani et al. (2018), the main reasons for this failure include the absence of KM capability in the organisation, poor project management, resistance to change by staff members, lack of management support after the decision to adopt the system,

and insufficient user training. This study aims to provide a clear directive on how organisations can use knowledge management with mediating variables as a significant tool to implement ERP.

Several scholars have studied the success factors of ERP implementation using KM, including the adoption processes, challenges faced during the adoption and implementation stages, conditions of success, and reasons for failure (Elhasnaoui, 2021; Epizitone & Olugbara, 2019). Other studies have also focused on adoption and system use (Al-Adwan, 2020; Reitsma & Hilletofth, 2018) and corroborate studies elsewhere.

The literature on past studies shows that ERP system implementation exposes organisations to socio-technical challenges, including people, organisation, culture, and technology, which need to be addressed to avoid implementation failures (Ray et al., 2018). Previous literature (Al-Adwan, 2020; Reitsma & Hilletofth, 2018) also highlights that employees of the adopting organisation tend to be reluctant to change and may fear losing their jobs when the system performs activities that were once done by humans. However, these frameworks and methodologies have been criticised in the literature for their shortcomings (Ahmadi et al., 2015; Parthasarathy & Sharma, 2014; Wong et al., 2005; Wu & Wang, 2006; Xu & Ma, 2008;).

Theoretical frameworks from previous studies (Alansari & Mishra, 2019; Alkraiji, 2020; Jinasena et al., 2020; Menon, 2019; O'Leary, 2002) lacked clear elaboration on the top management commitment of the organisation being studied. These studies also lacked clear goals focus, scope of study, and a clear ERP strategy and its alignment to organisational strategic objectives. Further, they did not provide a clear picture of staff training and preparation for off-take usage of the ERP, nor did they address employee resistance to change or the importance of user involvement in ensuring that the system is integrated with the organisation's objectives. In addition, these studies did not touch on the change management strategy and knowledge transfer with effects on ERP implementation. The lack of effective project management, monitoring, and knowledge sharing was also not well articulated in terms of how employees were made aware of and prepared for the changes ahead.

Moreover, there is still a dearth of academic literature linking ERP implementation success stages to the monitoring and evaluation of the system and linking it to public sector organisations in the South African context and their business strategies. Pontoh et al. (2019)

suggested that organisations should have a good business strategy framework to successfully implement the ERP system.

Previous studies (Parthasarathy & Sharma, 2014; Ahmadi et al., 2015; Wong et al., 2005; Xu & Ma, 2008; Wu & Wang, 2006) state that off-the-shelf software implementations involve only a vendor and a customer, overlooking the role of stakeholders in the system implementation. There has been minimal emphasis in the literature on the importance of KM during the ERP implementation lifecycle, and no previous study used mixed methods (qualitative and quantitative) in the South African context, as this study does. The aim of this study is to investigate the South African socio-technological environment and its influence on the variables that make it possible for public sector organisations to implement ERP systems for an organisation using knowledge management.

1.6 Significance of the study

Previous studies have investigated the relationship between ERP and knowledge management by focusing on isolated knowledge management elements associated with ERP implementation (Sedera & Gable, 2010). However, scholars such as Parry and Graves (2008) and Sedera and Gable (2010) have studied knowledge management without integrating it with the essential mediating variables necessary for a successful ERP implementation. This study aims to develop a conceptual framework that incorporates mediating variables critical to ERP implementation using empirical evidence from the NYDA case study. The results of surveys and interviews also contribute to the knowledge required for a successful ERP implementation.

The significance of this study lies in filling the gap in the literature on the relationship between knowledge management and the ERP system by developing a conceptual framework that focuses on mediating variables during ERP implementation in an organisation. The study is based on the public entity in the case study, and the literature explains the benefits and reasons for ERP adoption by public sector organisations. Existing research (Hadidi et al., 2020; Jayawickrama et al., 2019) has only isolated the issue of ERP knowledge management into small components, without incorporating the crucial nexus between ERP and knowledge management components.

1.7 Key contributions

The objective of this study is to enhance the understanding of the significance of KM and its acceptance during the implementation of an ERP system in public organisations and to promote a positive perception of its acceptance. According to Jayawickrama et al. (2019), an ERP system can enhance efficiency, quality of outputs, employee productivity, and profitability as it ensures speedy and accurate work instructions. Public organisations invest in ERP systems for their integrated application capability to enhance business processes, manage expenditure, and improve customer service (Jayawickrama et al., 2019).

In the next chapter, a conceptual framework would be presented and analytically evaluated in the literature. Knowledge-based views of an organisation in context would be employed as an independent variable to predict and interpret the hypothesis and address the research questions. Cohen and Olsen (2015) note that the theoretical relationship between KM and ERP was not adequately studied from a practical perspective in previous research. Organisations are becoming aware of the importance of consistently managing knowledge to stay competitive in the market for an extended period (Cohen & Olsen, 2015).

This study examines the literature on KM and the proposed mediating variables between KM and ERP implementation. It helps to scrutinise the theory from this literature and improve understanding of the attributes of knowledge and ERP implementation success. The study findings can assist corporate management in better implementing ERP in their organisation and investigate the mediating variables that contribute to successful implementation. The findings are expected to benefit all stakeholders in an organisation and vendors considering entering the African market, as they can use the proposed models to develop a better-aligned strategy suitable for the public sector market.

This study would assist organisations planning to implement ERP in South Africa to learn from the successes and failures of the NYDA, helping them avoid potential pitfalls. The findings would provide managers with a comprehensible method of ERP implementation that can be tailored to meet the demands of the context in which the ERP is being implemented. This study builds upon existing theoretical and empirical research on ERP, making a significant contribution to academic knowledge. It offers a better understanding of the socio-technological environment, which can pose a substantial risk to successful ERP implementation, and provides

practical insights into improving ERP adoption, implementation, and upgrades in South African settings.

Organisations must leverage their KM capabilities to customise the ERP implementation for their specific needs (Menon, 2019). Abusweilem and Abualoush (2019) highlight that organisations continue to face challenges when implementing ERP because they fail to align KM with the ERP implementation. This study explores how organisations can better utilise KM and mediating variables to implement a concrete ERP system successfully. The study identifies significant feedback loops and draws propositions from these loops. With the rate of unsuccessful ERP implementation projects alarmingly high (Menon, 2019), understanding the challenges organisations face during the implementation lifecycle is critical for those that have not yet purchased ERP, enabling them to study these challenges and avoid them. The study also analyses the literature gap in the relationship between knowledge management and ERP, providing recommendations for better strategies for ERP implementation.

This study proposes an academic piece that demonstrates the nexus of resource constellation, helping organisations consider the South African socio-technical environment during ERP system implementation. It will also benefit organisations seeking to understand the experiences and expressions of the NYDA employees, representing public sector employees, who are the end-users of the ERP system in this case study.

1.8 Overview of chapters

This thesis comprises six chapters, excluding the references and appendices. The chapters are interrelated and structured as follows.

Chapter One introduces the study by describing its objectives, research questions, and significance. It also locates the research gaps.

Chapter Two provides a comprehensive discussion of theories and mediating variables related to ERP systems, knowledge management, and KM for ERP implementations for public sector organisations. This chapter addresses the literature gap by exploring KM, ERP systems, ERP evolution, ERP implementations, the correlation of KM and ERP, the benefits of ERP for organisations, and various perspectives on KM for ERP implementations. It also discusses the socio-technical effects of ERP implementation and introduces a conceptual framework that addresses the KM competence for ERP success and the hypotheses.

Chapter Three discusses the research design and methodology. It explains the mixed-methods research approach used to answer the research questions and achieve the research objectives. This chapter also discusses the philosophy and paradigm of the study research methods, the type of research methods and techniques used for the study, and the instruments adopted and why they were adopted.

Chapter Four presents the quantitative data collected through online surveys, the analysis, and the empirical findings of this study. It demonstrates how the framework of knowledge management can be used during ERP implementations with the help of mediating variables.

Chapter Five presents the qualitative data collected through interviews. This chapter also presents the data analysis and empirical findings to provide an understanding of how data collection and analysis were conducted using qualitative methods specified in chapter three.

Chapter Six discusses and interprets the findings presented in chapters four and five, linking them to the literature and theories presented in Chapter Two and the conceptual framework. This chapter also details the conclusions across all stages of the study, discussing the theoretical contributions by comparing them with the literature for theorisation and managerial implications of the findings. It highlights the limitations of the study and provides suggestions for further areas of research. Finally, reliability and viability tests are done in this chapter by cross-referencing the findings of the quantitative and qualitative phases.

1.9 Chapter summary

In this chapter, the research topic of ERP implementation and knowledge management was introduced, with the importance of ERP systems in the corporate world explained. The research questions and objectives were presented to guide the study, while the research gap was identified and the significance of knowledge management for a successful ERP implementation was discussed. The chapter also highlighted the key theoretical contributions and managerial implications of the findings and provided an overview of the entire study. The next chapter will critically review literature relevant to the study objectives.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In the previous chapter, the research context was introduced. This chapter aims to critically review previous research conducted on the ERP domain, focusing on knowledge management and ERP implementation alignment. The chapter provides definitions of the ERP system, its evolution, and its importance in organisations. Additionally, the history and development of ERP software are discussed.

The chapter also examines the evolution of ERP and its benefits to the organisation, as well as its association with KM. The importance of KM in the organisation is explained, along with its diverse types of knowledge and its relation to ERP implementation success. It is explained that KM plays a critical role as an independent variable with the help of mediating variables, which in turn are essential in ERP implementation as a dependent variable.

Finally, a conceptual framework is proposed based on the relevant literature. The framework addresses the knowledge gaps in the public sector organisation's ERP implementation and contributes to the originality of the study. By integrating knowledge management with ERP implementation, the conceptual framework offers a solution to the challenges faced by public sector organisations in the South African context.

2.2 Knowledge management

Knowledge management refers to the processes and activities that support an organisation in generating, acquiring, discovering, organising, using, and disseminating knowledge among its employees (Justice-Amadi, 2022). This knowledge is transformed into information and experience which can be applied in decision-making, work processes, and strategic planning (Justice-Amadi, 2022). According to Abusweilem and Abualoush (2019), knowledge management enables employees to acquire, store, distribute, and apply knowledge continuously to achieve excellence. Oliveira et al. (2020) define knowledge management as a

process that helps an organisation create and transform valuable information and existing expertise needed for various managerial activities, such as decision-making, problem-solving, learning, and strategic planning.

As Dutta and Kumar (2021) argue, an organisation's knowledge is a precious resource for its competitiveness when used effectively. However, failure to use knowledge appropriately can cause more problems than it solves. Therefore, organisations need to configure modern technology and leverage the strategic value of technological software to remain competitive in a technologically advanced business world (Dutta & Kumar, 2021). Knowledge management provides a means of clarifying and unifying all the processes of an organisation. Echeverry et al. (2019) define knowledge management as the process of collecting data, producing information, distributing it, and effectively using and sharing knowledge within an organisation.

Candra and Putrama, (2018) defines knowledge as personalised information that may or may not be new, unique, useful, or accurate and can relate to facts, procedures, concepts, interpretations, ideas, observations, and judgements. A knowledge-based perspective has been widely discussed in the strategic management literature by authors such as Kianto et al. (2020), Simao and Franco (2018), and Donalds and Osei-Bryson (2019).

Effective management of both tangible and intangible assets is crucial for organisations (Kianto et al., 2020). To achieve this, the integration of KM and ERP is essential. However, the explicit theoretical perspectives on the relationship between KM and ERP are not well-established in previous studies. Although some studies (Andreeva & Kianto, 2012; Günsel et al., 2020; Jeng & Dunk, 2013) have highlighted the relationship between KM and ERP, they have mainly focused on identifying the successes and failures of such integration. This study investigates the mediating variables that contribute to the successful implementation of ERP and the benefits that organisations seek when purchasing ERP systems. Cohen and Olsen (2015) note that companies are increasingly recognising the importance of consistently managing knowledge, which allows them to maintain their

competitiveness in the market. However, it is crucial to follow the proper process flow of KM to ensure the success of knowledge management systems.

2.3 Conceptualisation of knowledge management

Since the mid-1990s, organisations have turned to the concept of knowledge management to gain a competitive advantage in increasingly competitive markets (Calvo et al., 2019). The goals of knowledge management include securing critical knowledge in cases where employees leave the company, by sharing this knowledge among the employees or storing it somewhere in the organisation; accelerating innovation and creativity; and making better use of employees' inactive or underutilised knowledge resources (Keiser, 2009).

An organisation can create, change, and store knowledge on a cloud network that is accessible from different points of working clusters within an organisation (Choi et al., 2020). Although the value proposition of knowledge management may seem obvious for any organisation, organisations often struggle with the definition, acquisition, preservation, management, and dissemination of the knowledge that is found within them (Saxena & McDonagh, 2017). To remain competitive in the market, an organisation needs an integrated strategy that aligns knowledge management with other implemented management tools and systems, including Supply Chain Management (SCM) and ERP, to help them attach knowledge resources (Islam et al., 2022). Sedera et al. (2003) and Kucharska and Erickson (2019) suggest that an ERP system that helps an organisation use its SCM will contribute to knowledge management outcomes, which can be considered an antecedent to ERP success.

Proper use of knowledge management in the context of sustainability leads to a shift in an organisation's position when social and environmental responsibility are evaluated alongside economic profitability gains (Chang et al., 2018). Knowledge management can be used as a basis for sustainable development practices. Therefore, knowledge management is treated as a new development paradigm that aims to improve compliance with the guidelines of economic, environmental, and

social sustainability for the organisation (Chang et al., 2018; Jabeen & Al Dari, 2020; Latilla et al., 2018; Martins et al., 2019).

Knowledge management is essential for any organisation to effectively compete in the market (Chang et al., 2018). The knowledge that an organisation uses for commercial purposes, such as trading and being competitive in the market, is different from philosophical and scientific knowledge. Often, organisations that want to participate in knowledge-intensive sectors of the global organisation face challenges and sometimes fail to organise themselves so that they can recognise the difference (Dalkir, 2017).

2.4 Theoretical foundation of knowledge management

A strong knowledge management capability enhances an organisation's performance because commerce is transitory (Hislop et al., 2018). Organisations must understand that to be successful, knowledge needs to be managed and measured (Jennex, 2020). The cultural background of an organisation plays an important role in predicting the rules and prescriptions for performance categories. Without being distributed or disseminated, knowledge cannot increase a company's performance in the marketplace (Hislop et al., 2018). Karakuş and Güneş (2021) argued that KM is the backbone of an organisation's systems that underpin the observation and measurement of any organisation's performance. Therefore, it is important to preserve and constantly review knowledge while keeping it monitored all the time.

Knowledge is a product of power relations that holds all an organisation's sub-departments together. Hislop et al. (2018) explained knowledge management as a component that comprises information, information technology, security, operations procedures, intangible intellectual capital, and brands. Every organisation must develop a strategy that helps it preserve its knowledge, irrespective of its cost. This strategy should be useful enough to help the organisation achieve profitability (Rouhani et al., 2017). It should also be able to improve the organisation's business processes, monitor, and evaluate existing knowledge and manage it effectively.

Knowledge consists of the insights, understandings, and practical expertise that an organisation's staff members possess, allowing an organisation to compete intelligently with others (Liu et al., 2020). Considerable knowledge is transformed into other appearances such as eBooks, technology devices, published works, practices, and traditions in organisations over time. Published transformations result in concentrated expertise and increased effectiveness for the organisation (Shujahat et al., 2019).

The concept and terminology of KM were originally introduced by the management consulting community (Sahibzada et al., 2020). In the early 1990s, organisations used intranets as an internal subset of the Internet to make information accessible and share it between geographically distributed units of their organisation. However, the realisation of the Internet, including cloud networks and applications (apps), came later (Nakash & Bouhnik, 2021). Organisations soon realised that building tools and techniques like dashboards, expertise locators, and databases required time and expertise, which posed challenges for large organisations (Nakash & Bouhnik, 2021). To address this, they developed a new product called knowledge management.

Knowledge is a critical source of competitive advantage and an essential component of an organisation. Akter and Banik (2019) explained that KM involves building relationships with stakeholders of an organisation and includes information, communication, human resources, intellectual capital, and brands. Although it poses challenges such as usefulness, transferability, and quantity, it is still crucial for an organisation. Rezaei et al. (2020) defined knowledge as a cognitive success that epistemology is concerned with understanding. This concept has received more attention in recent epistemology than any other type of cognitive success. The English word "knowledge" means the verb "to know" and the noun "knowledge". Knowledge is typically distinguished from data, which represents information that has been processed and observed to produce facts out of context and therefore not directly meaningful. Information is more important because it allows one to place data in meaningful contexts of a message.

2.5 Knowledge management effectiveness (KME)

Effective management of knowledge can help employees to generate, transfer, and use knowledge to improve an organisation's performance (Marr et al., 2003). However, organisations need to learn how to collect, analyse and disseminate knowledge effectively to make the best use of the data they have. Despite understanding the value of collaboratively formed and efficiently managed knowledge, organisations often fail to share knowledge between departments due to lack of lessons learned from the information gathered and restrictions on knowledge sharing.

Therefore, organisations need to implement appropriate processes and make feasible decisions at the right time to enable effective knowledge management, resulting in fewer mistakes and adaptation to changing business environments. Knowledge dissemination in an organisation should start with senior managers constantly sharing knowledge with their subordinates (Rasula et al., 2012) using tools, techniques, and strategies for storing, organising, and sharing business ability. The success of an organisation's knowledge effectiveness is demonstrated by the willingness of employees to participate and share knowledge with their colleagues.

2.6 Factors contributing to knowledge management effectiveness

The effectiveness of an organisation's KM is influenced by various factors such as culture, structure, strategy, and technology (Sayyadi, 2019). Effective knowledge sharing and transfer require commitment and constant communication from the top management to all subordinates in the organisation. The effectiveness of KM can be assessed from a process perspective (Oltra, 2005; Sayyadi, 2019). KM effectiveness is measured by the organisation's ability to manage the knowledge it has acquired, shared, and applied in its programmes, thereby improving its performance. Effective KM enables organisations to achieve breakthrough competitive advantages and demonstrate higher levels of innovation. The key KME factors that contribute to organisational performance are as indicated in the subsections that follow.

2.6.1 Impact of KME on public organisation

Effective KM is a critical aspect of organisational performance as it helps organisations recognise the value of their assets (Centobelli et al., 2019). To improve organisational performance, constant review of KM is necessary for effective decision-making, as it enables organisations to consider public voices, interests, and concerns (Centobelli et al., 2019). KM also helps organisations deal with economic problems, which leads to project success and organisational efficiency (Biloslavo et al., 2019).

The application process of KM effectiveness (KME) is essential in defining the benefits or improvements of performance, and it allows organisations to justify their investments. Developing and operationalising KME performance metrics enables organisations to evaluate performance improvements and identify problems and bottlenecks (Al-Mahruqi et al., 2019). This process helps organisations set new goals and targets, determine the future course of action, and facilitates benchmarking of performance. Measuring these metrics also helps organisations identify whether they need to continue or adjust their current strategies. Al-Mahruqi et al. (2019) suggest that public sector performance can be measured by innovation, quality of service delivery, and operational efficiency.

2.6.2 The influence of organisational culture on KME

Organisational culture refers to the set of traditional experiences and operational context that exists within the framework of plans, agreements, stakeholders, and practices that an organisation utilises to operate (Intezari et al., 2021). It is a specific set of values and norms shared by individuals and groups within an organisation that guides how they interact with each other and with stakeholders outside the organisation (Bardan & Mazlan, 2018). Effective knowledge management enables an organisation to create knowledge-based values and traditions, while motivating management to transfer knowledge (Al-Abdullat & Dababneh, 2018). The positive influence of organisational values and traditions is an important factor in the effectiveness of KME.

The ability of employees to share knowledge is influenced by organisational culture (Bardan & Mazlan, 2018). Thus, it is essential for teamwork and for facilitating the interpersonal interaction and collaboration necessary for knowledge flow, making it a valuable tool for organisational success. Reducing the risk of individual reluctance to share knowledge and the associated loss of competitiveness is the most critical element of a knowledge-sharing culture (Bardan & Mazlan, 2018). Organisations must create a culture that allows easy access to knowledge from top management during the knowledge management implementation phase. Aligning organisational culture with knowledge management goals is a complex process that requires careful planning and implementation, particularly in organisations characterised by highly hierarchical hierarchies and bureaucratic management (Bardan & Mazlan, 2018).

2.6.3 The influence of organisational structure on KME

The arrangement of power lines, interactions, and the rights and responsibilities within an organisation is known as its organisational structure (Bamel & Bamel, 2018). Organisational structures help organisations to analyse roles, authority, task management and data flow within different levels of management (Bamel & Bamel, 2018).

As suggested by Islam and Widen (2021), a decentralised structure can promote internal communication and acceptance of modernisation, leading to higher levels of inventiveness which positively impact KME implementation in an organisation. However, a centralised structure may hinder communication between organisational groups, limit individual opportunities for development and improvement, and impede the emergence of innovative solutions to problems (Song & Sun, 2018). Thus, centralisation has a negative impact on KME, while decentralisation has a positive influence.

From the literature above, it can be concluded that organisations should endeavour to decentralise their organisational structure to enhance the effectiveness of knowledge management.

2.6.4 The influence of organisational strategy on KME

Mia and Chowdhuary (2021) posit that a sound organisational strategy can only be attained when an organisation communicates with its competitive environment to achieve its targets and stay competitive ahead of its rivals. This underscores the importance of having a positive organisational strategy for any organisation to operate efficiently and achieve all its outputs effectively.

Implementing a KM strategy requires patience, and it is best to adopt a pilot-based and phased approach that incorporates change management activities throughout the implementation process. The management should also embrace an adaptive roll-out phase that allows for adjustments and modifications to the plans and activities to avoid failing miserably due to a lack of resources and understanding of the implementation and organisational culture.

Having a positive organisational strategy is crucial for achieving KME. An organisation must communicate effectively with its competitive environment to attain its targets and stay ahead of its competitors. Furthermore, organisations should adopt a pilot-based and phased approach when implementing KM strategies to ensure the success of the process.

2.6.5 The influence of organisational technology on KME

Duffy (2000) argues that technical systems have contributed to the growth of KM by enhancing efficiency, reliability, and cost-effectiveness. Technology-driven KM enables organisations to accelerate the speed of knowledge transfer while supporting the flow of knowledge through networks and communities, thereby enhancing existing business practices such as IT strategy to improve effectiveness. Technology elements provide an overall framework and guide and drive the KM process by facilitating the collection, storage, retrieval, sharing, and active engagement with the organisation within an organisation while enhancing access to knowledge and combining knowledge for proper use (Alkhaffaf, 2018).

Effective use of an organisation's technical resources, therefore, has a positive impact on KME. Alkhaffaf (2018) posits that the processes and strategies of KM

are pivotal in motivating organisation leaders and management to acquire and transfer knowledge to their subordinates to attain effective outcomes regarding KM. Therefore, identifying appropriate processes, strategies, tools, and methods to be used is considered a crucial factor in facilitating the flow of knowledge in an organisation. Organisational policies, processes, and systems can be used to determine how knowledge is accessed and subsequently flows throughout an organisation.

2.7 Classification of knowledge

Scholars have different views on the definition of knowledge, but it is commonly categorised into three forms (Latilla et al., 2018). The first form is tacit knowledge, also known as procedural knowledge, which actors rely on to act, but cannot be explicitly stated (Hadjimichael & Tsoukas, 2019). The second form is explicit knowledge, which is knowledge that can be articulated and expressed but does not exist as such (Maravilhas & Martins, 2019). The third form is embedded knowledge, which can be articulated and is often referred to as declarative knowledge (Chen et al., 2019). The following is a taxonomy and definition of the meaning of all these knowledge types for an organisation.

2.7.1 Tacit knowledge

The incorporation of tacit knowledge in an organisation's operations and competitiveness, particularly in the construction industry, serves as a renewable and sustainable basis (Hadjimichael & Tsoukas, 2019). Tacit knowledge is a form of practice that helps individuals generate the best solutions and reduce repetition by drawing on information about their experiences, abilities, and understandings, according to Feller et al. (2013). It is often abstract and not easily articulated, which makes it difficult to manage or imitate, and is usually transmitted through communication and shared skills (Feller et al., 2013). Skills and behaviours acquired in specific and overly sensitive situations are derived from tacit knowledge.

Tacit knowledge is generated and maintained by employees of an organisation, and it is critical for organisations to gather this knowledge from their employees' experiences and skills related to both internal entrepreneurship and entrepreneurial activity, which covers a wide range of behaviours and processes, including innovation and organisational creation (Asher & Popper, 2019). When designing products, organisations can truly assess their understanding of their customers by applying tacit knowledge (Ojasalo & Ojasalo, 2018).

To effectively utilise tacit knowledge, organisations must implement policies that facilitate human interactions in terms of and related to tacit KM, which encourages innovations and strengthens strategic guidance for KM itself (Olaisen & Revang, 2018). Tacit knowledge contributes to an organisation's competitive advantage by being achieved through operational changes in the design process, resulting from the application of tacit knowledge (Olaisen & Revang, 2018).

2.7.2 Explicit knowledge

Explicit knowledge refers to information that is expressed in an organised and nuanced language and can be conceptualised and preserved in data systems. It is commonly known as know-what (Maravilhas & Martins, 2019). KM is an effective tool for managing explicit knowledge because it can provide the recovery and alteration of files and texts. The role of explicit knowledge in an organisation is to change organisational definitions and formalised technical or management procedures (Maravilhas & Martins, 2019). It is essential for lower-level project members to have a clear understanding of the end goal, so that they can focus on specific knowledge and implement it correctly in their projects to complement the needs of the organisation. This includes expanding appropriate strategies and knowledge transfer within the enterprise, which involves changes in employee participation at various hierarchical levels (Maravilhas & Martins, 2019), as well as the use of artificial intelligence and systematic manipulation by computational techniques.

2.7.3 Embedded knowledge

Embedded knowledge refers to information that is implicit in an organisation's rules, processes, products, manuals, codes of conduct, ethics, culture, routines, artefacts or organisational structures. It is often referred to as knowledge that is protected by operations, commodities, traditions and routines (Chen et al., 2019). Organisational managers attempt to use embedded knowledge to help deal with certain useful routines that are easy to manage and implement, while also instilling morale and educating their subordinates. Embedded knowledge can be formalised by introducing employees to specific useful routines through management initiatives. Alternatively, the organisation can choose to use the other two types of knowledge, while informally introducing the knowledge embedded in the organisation. The culture and routines make the embedded knowledge difficult to understand and hard to change. An organisation that succeeds may enjoy a significant competitive advantage due to the effectiveness of embedded knowledge, which forces organisations to be more attentive to understanding it.

2.8 Factors that influence knowledge management in public sector organisations

The successful application of knowledge management in an organisation depends on various critical factors, such as the organisation's strategy, structure, people, and technology, with individuals, groups, and the organisation being the essential elements in the KM process and forming the basis for a well-executed knowledge management system (Agrawal & Mukti, 2020). Cultural factors, including values, beliefs, and assumptions held by organisational members, also play a crucial role in the knowledge management process (Agrawal & Mukti, 2020). To develop knowledge effectively within an organisation, knowledge dissemination, transfer, and application must be carried out efficiently, with the use of organisational strategy to guide KM activities, such as processes. Organisational knowledge becomes the backbone of KM when knowledge from an individual's sphere of influence is developed and stimulated within the organisation, providing a structured learning process, integrating knowledge sharing into daily activities, creating appropriate structures and cultures that encourage individuals to share what

they have learned from their skills, and fostering organisational memory. Emphasis is placed on knowledge from databases and processes, sustainable systems, and goods and services that are more accessible within the organisation (Nair & Munusami, 2019).

Martins et al. (2019) define knowledge management as the process of extracting organisational knowledge from its mission, integrating technology with organisational structure and strategy to execute these activities, and managing the organisation's current and future production of new knowledge. Knowledge management measures cannot ignore organisational customs, agreements, people, and political order because of their expertise in the transfer and management of knowledge within the organisation. Therefore, when implementing knowledge management, an organisation's culture, structure, strategy, and technology must be considered.

a) Organisational culture

Organisational culture encompasses the expectations, experiences, philosophies, and values that guide the behaviour of an organisation's members and is expressed in their self-image, interactions with the outside world, and expectations for the future (Isensee et al., 2020). It is based on the shared attitudes, beliefs, and practices of an organisation's employees, as well as written and unwritten rules that are considered valid and evolve over time (Elsbach & Stigliani, 2018). An organisation's culture includes its vision, values, norms, systems, symbols, language, assumptions, beliefs, and habits (Isensee et al., 2020), and is reflected in the way things are done within the organisation (Paais & Pattiruhu, 2020).

Organisational culture shapes employees' behaviour and relationships with each other, customers, and stakeholders. It also affects how employees learn and share information. Shared values, norms, and beliefs within an organisation enable individual, group, and organisational levels to inspire, support, persuade, generate, share, and use knowledge, making it an integral part of KM's success. Organisations that understand their culture can achieve competitive organisational performance and effective management. Adhocratic cultures have a constructive

influence on the direction of progress and performance, while basic tendencies positively influence the direction of mimicry (Lubis & Hanum, 2020).

In conclusion, organisational culture plays a vital role in the flexibility, stability, mission, and participation that are linked positively with organisational effectiveness and KM. It connects organisational trends and organisational efficiency that impact the effectiveness of members of an organisation directly and not the actual organisation.

b) Organisational structure

Organisational structure refers to the way an organisation delegates tasks and responsibilities to achieve its goals, and it outlines the roles and responsibilities of employees, their powers as they move up the organisational structure, and the efficiency of the organisation's operations (Isensee et al., 2020). It is crucial for an organisation to define a strategic structure that enables them to achieve their goals effectively and efficiently. The organisational structure varies depending on the size of the organisation, and a poorly aligned structure may negatively affect organisational efficiency, while a decentralised structure may positively contribute to the success of KM (Isensee et al., 2020).

The literature above acknowledges the importance of regulatory divisions and different units of an organisation, specialisation in work and the presence of specific tasks, the scope of supervision, lines of authority, and decision-making positions in terms of centralisation and decentralisation and their roles in an organisational structure. Designing an organisational structure that facilitates KM and benefits from the rationalisation of decision-making can expand an organisation's knowledge base by converting tacit knowledge into explicit knowledge (Joseph & Gaba, 2020).

The surrounding environment of an organisation also plays a crucial role in its efficiency and effectiveness, and a stable and mobile environment has a positive degree of complexity to the organisational structure, which requires complexity for a high degree of decentralisation so that the organisation can respond to changes in

its environment (Joseph & Gaba, 2020). Aligning an organisation's knowledge with its strategy, operations, and individual activities gives it a competitive advantage. A carefully aligned strategy directs the focus of the various activities of an organisation according to the groupings and workflows, which are formed through the influence of an organisational structure (Isensee et al., 2020).

c) Organisational strategy

Organisational strategy refers to the framework developed by an organisation's management to link specific KM strategies to specific challenges and utilise the multidisciplinary expertise of its employees (Castaneda et al., 2018). The Political, Economic, Social, Technological, Environmental and Legal Analysis (PESTEL) can be used to match knowledge resources and capabilities to strategic opportunities and threats and to understand specific strengths and weaknesses. This helps an organisation to map its strategy, which serves as a guide for KM efforts within the organisation. Strategic planning considers business needs and resource allocations across all teams, plans for both the long and short term, and provides decision-makers with access to a coordinated roadmap across the organisation (Castaneda et al., 2018). The roadmap is crucial in facilitating decision-making and enabling the entire team to achieve strategic goals.

Organisational strategies are built on the Vision, Mission, and Values (VMV) of the business. The strategy defines why the company exists and what its long-term goals are, helping stakeholders in strategic decision-making based on the organisation's mission (Castaneda et al., 2018). The vision provides a direction in which an organisation wants to see itself going, while values define the business ethics and sustainability. For a strategy to be useful in creating the building blocks of a business strategy, it must be authentic to the organisation.

d) Technology

The role of technology in knowledge management is to facilitate the acquisition, organisation, storage, retrieval, distribution, presentation, and maintenance of an organisation's operational information. By providing a seamless pipeline for the flow of explicit and tacit knowledge, technology enables the capture and management of human-added value in the knowledge conversion processes (Alkhaffaf, 2018). Technology's capacity to extend the reach of individuals beyond formal communication lines and to enable knowledge workers to share information from multiple sources increases knowledge transfer. Moreover, information technology supports knowledge application by embedding knowledge into organisational routines and by enhancing the speed of knowledge integration and application through the codification and automation of organisational routines (Alkhaffaf, 2018).

2.9 Enterprise Resource Planning

IT has become a crucial aspect of an enterprise's ability to compete successfully in the global marketplace. Nowadays, no organisation can function without considering its technology needs (Kiran & Reddy, 2019). In the early 1990s, Customer Relations Management (CRM) and Business Process Re-engineering (BPR) were implemented by companies as the main software to manage their functions (Kang et al., 2020). Later, in the late 1990s, ERP systems were introduced, and after the year 2000, organisations were keen to move to ERP. ERP software is one of the software package systems that could recognise the year 2000, which CRM and BPR could not (Kang et al., 2020). This is because CRM and BPR were not designed to accept dates from the year 2000 onwards, resulting in an error message.

ERP refers to the automation and integration of an organisation's core business and is understood as an industry acronym (Al-Adwan, 2020). Kang et al. (2020) explained that any organisation that adopts ERP systems aims to accelerate productivity, efficiency, and organisational competitiveness to achieve a

competitive edge. Al-Adwan (2020) also emphasised the competitive edge that organisations gain by adapting to ERP and maximising their market share.

Al-Adwan (2020) further defined that ERP enables a holistic view of the business to be represented within the data systems in the architecture where all organisational activities are initiated and stored. The ERP system allows causal relationships between the graphical model of the most important business processes and the software implementation of these processes, ensuring a higher level of integration (Al-Adwan, 2020). Additionally, a single ERP system can achieve a level of security that multiple software platforms cannot easily achieve.

ERP software is defined as a packaged business software that allows organisations to automate and integrate their business processes, share common data and practices across the enterprise, and access information in real-time in changing business environments (Hasan et al., 2019). The goal of an ERP system is to ensure that information is entered only once and stored forever, enabling intelligent automation and integration of an organisation's core business system, thereby improving effectiveness and simplifying success efficiently. In the modern business world, ERP is one of the most important business information systems, seamlessly integrating different business processes across departments and performance areas into a coherent system (Bjelland & Haddara, 2018).

Hasan et al. (2019) emphasised that the implementation of ERP systems requires a considerable investment in time, money, and internal resources and involves technical and business risks. Thus, the implementation must be carefully executed to ensure a positive Return on Investment (ROI) for the adopting organisation over time. Handityo et al. (2021) stated that organisations often use ERP systems to respond to constant requests from suppliers and/or distributors in their extended supply chain to provide them with intersystem linkages. Handityo et al. (2021) defined ERP as "an integrated enterprise computer system designed to automate the flow of material, information, and financial resources among all functions within an enterprise on a standard database". Kemboi et al. (2019) identified ERP as an enterprise-wide package that combines business processes into one shared database. Hossain and Zyngier (2021) described ERP as an exhaustive software package that

integrates business functions by using a shared information flow. All of these studies emphasise the benefits of ERP when implemented properly and integrated into an organisation's operations, leading to positive outcomes that are ideal for the adopting organisation.

Organisations adopt ERP systems for various reasons. Process standardisation and process automation are two of the most prominent reasons for ERP adoption (O'Leary, 2019). Historically, most organisations employed disparate information systems to provide the breadth of functionality of an ERP system. The system provides a standardised, tailor-made, and integrated, process-focused environment that is difficult to achieve and viably maintained with stand-alone, custom-built software systems. Because of its process-oriented automation, ERP systems enable the dissemination of information in real-time, improving managerial decisions in organisations (Fernandez & Aman, 2018).

According to Kang et al. (2020), an ERP system enables effective and consistent communication of information within an organisation, while keeping the data in a secure cloud accessible to all users through a shared database. This results in shorter cycle times for business transactions and deliveries, faster response to customer needs, easier access to information by all departments and sub-departments within an organisation, and real-time information that reduces redundancy.

While the term ERP may not be easily understood, it refers to business software that has been designed to record, manage, and store enterprise information (Menon, 2019). The implementation of an ERP system is unique and tailored to the specific organisation adopting it, which can be expensive and time-consuming (Menon, 2019). In South Africa, major vendors of ERP software include Microsoft, SAP, Oracle, Epicor, SAGE, and People Soft.

For retail businesses, ERP systems integrate core business processes such as customer orders, operations scheduling, inventory and financial records, as well as human resources, IT, finance, audits, risk and legal, marketing and sales, into one package that simplifies and streamlines the organisation's processes (Kiran & Reddy, 2019). ERP systems provide benefits that assist with overall business

performance management, such as intelligence, visibility, analytics, and efficiency across all aspects of the organisation, as well as a single source of truth and digitalisation (Kiran & Reddy, 2019).

ERP implementation can be a challenging undertaking for organisations, particularly those that are unwilling to alter their culture and business processes, even for those operating mostly in developed countries (Menon, 2019). Saxena and McDonagh (2019) noted that organisations adopting ERP systems are often influenced by the fact that ERP vendors require them to change their operational processes to match their business practices of integrating ERP packages, rather than adapting their ERP systems to their operations. Furthermore, the growing need to adopt e-commerce and cloud networking may put pressure on organisations to go paperless and adopt a system that will help them operate on a cloud network (Saxena & McDonagh, 2019). ERP system vendors may help organisations tailor the processes of the ERP system by using their existing sources of knowledge, resources, and norms when developing a system for a specific organisation. An off-the-shelf system may lead to a purchase of the vendor's business strategy instead of having a system that matches the purchasing organisation's business strategy (Putra et al., 2021). ERP packages reflect that organisations tend to believe in a single enterprise-wide system that is aligned with and integrated with all the business processes and share data among the subdivisions of the organisation (Kirmizi & Kocaoglu, 2020).

According to Al-Okaily et al. (2021), ERP is an advanced contemporary system that manages and integrates business processes through a single system, helping an organisation achieve its goals. From the literature discussed above, it is clear that organisations need ERP to help them plan and allocate resources. ERP has demonstrated that organisations that opt for its installation avoid operating in a siloed approach, with each department having its system. The most attractive feature of the ERP system is its ability to integrate core organisational activities by joining the most significant organisational practices to facilitate prompt decision-making for an organisation at reduced costs while providing informed managerial control activities (Obwegeser et al., 2019).

2.10 Evolution of enterprise resource planning

The Gartner Group first introduced ERP in the early 1990s as a new category of hardware and software solutions that extended the scope of traditional Manufacturing Resource Planning (MRP) systems (Dziembek, 2021; Goldston, 2020). ERP has its roots in manufacturing and is the successor to MRP and MRP II, according to Kemboi et al. (2019). MRP was introduced in the 1970s as a production-oriented information system that introduced the time order release system to schedule and release production orders and purchase orders as scheduled by the business owner, ensuring that subassemblies and components arrive at the assembly station just in time (Handityo et al., 2021).

Goundar et al. (2021) state that MRP was primarily used to calculate gross material requirements, thereby contributing to a significant improvement in the materials planning process. Akyurt et al. (2020) suggest that MRP can lead to reduced inventory costs, improved customer service, and increased efficiency and effectiveness.

ERP is considered an upgrade to MRP, an addition to already established capabilities. It is a modern system at the forefront of manufacturing and financial information systems that have evolved over the past decades to synchronise the flow of knowledge with the flow of physical products (Rouhani & Mehri, 2018). Permatasari and Natasha (2019) indicate that the first steps were taken in the early 1960s when a manufacturer began using MRP software to organise the flow of information about the manufacturing process.

The history of ERP dates back to the early 1980s when a more affordable technology known as Manufacturing Resource Planning II (MRP-II) was introduced (Permatasari & Natasha, 2019). MRP-II was designed to help manufacturers plan all kinds of resources and was expected to encompass all resource planning across the organisation. Its primary goal was to provide insight into the impact of key production schedules and material schedules, and it involved the movement of inventory with coincident financial activities (Goundar et al., 2021).

In the 1990s, a software developer developed the first ERP/ERP II software (Permatasari & Natasha, 2019). This software was a more advanced suite of applications that could link all internal processes and cross-organisational processes, such as supplier and customer relationship management. ERP is a generic term used to describe this new class of application packages, which is often a comprehensive package solution aimed at fully integrating all business processes and functions and storing all information in a cloud network.

Table 2.1: ERP evolution

YEAR	MAIN INVENTION	REFERENCES
The 1900s	MRP was introduced and mostly used by manufacturing firms to streamline their processes.	Hasan et al. (2019) Hossain and Zyngier (2021) Goman and Koch (2021) Seres et al. (2019) Ullah et al. (2020) Pal et al. (2020) Kemboi et al. (2019) Nguyen et al. (2021) Pradhan and Brazel (2021) Ramayah and Lo (2007)
The 1970s	The scope of MRP was expanded to MRP-II, which served as a more advanced software system that extended and expanded the scope of traditional manufacturing resource planning (MRP).	
The 1990s	The Gartner Group introduced ERP, which is a more advanced suite of applications capable of linking all internal processes as well as inter-organisational processes such as supplier and customer relationship management. ERP software is one of the software package systems that could recognise the year 2000 and thus was implemented by companies to address the year 2000 problem, which neither CRM nor BPR could solve.	

Source: Goldston (2020)

2.11 The association of the enterprise resource planning system to the knowledge management of an organisation

Chang and Hsu (2019) argue that organisations require both ERP systems and KM to leverage the respective values of information and knowledge. ERP serves as an enterprise information system that can provide a platform for capturing, storing, sharing, modifying, and innovating knowledge, as KM is fully dependent upon integrating data and information through ERP. Thus, KM aligned with ERP is highly likely to improve an organisation's business processes and increase its competitive advantage. Previous literature highlights the synergistic interaction between ERP and KM, emphasising its significant importance for any organisation striving to maintain an advanced position in the market.

Concurrently implementing ERP and KM systems is essential for optimal organisational performance. The interaction between ERP and KM systems can be analysed from two perspectives: the effects of ERP on KM and the benefits of KM for ERP implementation, to keep track of progress in the market. ERP systems offer transaction processing capabilities that help integrate an organisation's transaction activities from one department to another and their sub-departments, making it easier for them to plan activities such as production, where KM can be useful for a series of activities, including transaction processing support. Systems like SAP software can provide solutions for knowledge management and transfer, which are integrated into an interface to share with various other components of the system (Vernadat, 2020).

Organisations are increasingly adopting ERP systems due to the technological advancements in the business environment. This includes a shift towards cloud networks, as more organisations allow employees to work remotely, avoiding the need for physical offices. Moreover, the impact of COVID-19 has further highlighted the need for transaction-oriented data and business processes to enable remote work on an organised centrally located network (Mukherjee et al., 2021). The ability of ERP to integrate all necessary business functions into a single system with a shared database has made it the preferred system of choice for organisations (Hezel et al., 2022; Igna et al., 2020; Mukherjee, 2021; Widodo et al., 2022), as it

helps them meet their targets easily and maintain their competitive positions in the market, even during the pandemic.

ERP has become the most common IT infrastructure that enables organisations to develop a fully integrated and homogenous network (Nacarelli & Gefen, 2021), a feature that organisations consider essential when adopting the ERP system. Despite the numerous benefits of ERP, many organisations still struggle with implementing the system successfully (Alsayat & Alenezi, 2018). Organisations often opt to terminate the implementation before completion. It should be understood by management that the system can be purchased in a standardised format or tailored to fit the purchasing organisation's business processes (Alsayat & Alenezi, 2018). Failure to tailor the system is the main reason for implementation failure. According to Menon (2019), there are critical success factors for ERP implementation at the strategic and tactical levels. The ERP system is considered a legacy system, as it reflects the business vision and organisational strategy continuously reviewed by top management to ensure that it aligns with the organisation's visions (Hartio, 2019). The project schedule is the most significant strategic factor during implementation, and management needs to consult with end-users and clients to whom the products are delivered to configure the software adequately. These activities require effective monitoring and evaluation, communication, and gap configuration before adopting the system.

ERP has a remarkable capability of gathering information about day-to-day business operations, providing a large amount of data and information within an organisation that can be used as knowledge after proper processing and integration. Thus, ERP systems become a significant channel for knowledge collection, exploration, and dissemination as part of knowledge management, enabling user innovation (Liang et al., 2022). ERP integrated with KM makes a significant difference in what knowledge is available to capture, store, use, and share. In this way, ERP allows knowledge of an organisation's business processes to expand further as ERP experience grows, making knowledge management a fascinating task.

A strong KM system for an organisation to implement its ERP can efficiently support ERP implementation without delays or early problems. Knowledge management also enables and facilitates the transfer of knowledge between consultants, IT staff, business process engineering, and management (Liu et al., 2020). This transfer is characterized by the multidimensionality and diversity of sources flowing from all divisions and subdivisions of the organisation.

KM creates a mechanism to manage all knowledge resources, making it easier for ERP to manage the rest of the organisation's physical resources. Information and knowledge exchange require a knowledge interface so that KM can process commerce and related data collected and managed by the ERP system (Liu et al., 2020). Since a KM system involves not only organisational knowledge contained in business processes managed by an ERP but also personal knowledge partially managed by an ERP, there is a need to implement a KM system for knowledge management. The ERP system platform is the most essential element of business management.

2.12 Why should organisation consider implementing an enterprise resource planning solution?

In today's highly automated, IT-driven business environment, companies need to keep up with innovative technologies to remain competitive (Alieva & Von Haartman, 2019). Sheik and Sulphey (2020) emphasised that adopting innovative technology puts an organisation in a competitive position and helps to gain a reasonable market share compared to its competitors. The ERP system offers significant benefits to companies that adopt it by integrating business applications with real-time information and providing cloud storage for retrieving that information (Sheik & Sulphey, 2020). Businesses can benefit from cloud computing services by having access to infrastructure and software that they pay for on an ongoing basis. As Akyurt et al. (2020) stated, cloud computing offers companies the opportunity to advance their IT skills in ways that were previously not possible. The ERP system also provides administrators with the opportunity to meet increasing business requirements in more effective and efficient ways than any previously implemented IT solution.

The importance of ERP systems in practice is rapidly increasing during the era of the Fourth Industrial Revolution (4IR). In every division and sub-division of any industry, there are vendors to choose from for implementing these systems, but a wise decision should be made to select the one that can thoroughly understand an organisation and integrate its functions perfectly (Liu et al., 2022).

This shows that standard functionality can be developed and applied across different companies and industries. It can be argued that academia should pay more attention to ERP and its lifecycle, as the system can vary from one organisation to the next and needs to be tailor-made to fit their needs. Dinh Long, Ngoc and Görg, (2021) explained that the rationale for ERP implementation should be based on the need for explicit adaptive knowledge, which is everything that an organisation requires to remain competitive in the market. Moreover, the ERP system must rapidly convey this best-of-breed knowledge to the world. The successful adoption of the 4th Industrial Revolution (4IR) relies on the commitment of governments, businesses, and citizens to support the transformation or digitisation and their willingness to learn and have the resources to do so.

Innovative technologies play a crucial role and are as important as knowledge management in an organisation. Every organic organisation gains a competitive advantage over its competitors, which is one of the reasons implementing organisations are investing millions of Rands in ERP projects. The non-financial benefits of ERP implementation include information visibility and flexibility in an organisation's functions (Krakri, 2020).

The integration of knowledge management and ERP is essential for the successful implementation of the system. The study provides guidelines for public sector organisations planning to adopt ERP on how to utilise knowledge management practices throughout the adoption process. It is intended to be useful for decision-makers in public organisations who plan to implement ERP applications and help them understand the complexities involved. This study identifies the nexus of KM and ERP adoption factors regarding their sequence of occurrence in distinct stages of ERP implementation. It also serves as a source of guidance for organisations planning to implement ERP on what to avoid doing during the implementation

process and how to fully utilise knowledge management in the public sector, which could help reduce the high failure rate of ERP implementation.

In today's technology-driven world, the competitive advantage of organisations is heavily reliant on their intellectual resources, rather than just their physical resources, to succeed in the market (Sheik & Sulphey, 2020). The shift towards intangible assets has required organisations to invest time, capital, and effort into managing their intellectual property capabilities, as exemplified by companies such as IBM, HP, and Dell (Brooker et al., 2019). Furthermore, the mobile workforce of today necessitates that organisations consider the age of their physical assets and their intellectual, physical, and capital assets (Li et al., 2018) to effectively manage them and secure their clients and profitability (Li et al., 2018). The integration of KM and ERP is crucial to managing both types of assets effectively.

Sedera and Lokuge (2019) established a significant and positive relationship between KM capability and the success of an organisation's ERP implementation. Their proposed conceptual framework demonstrated the importance of KM competence in ensuring flawless ERP implementation, with variables such as staff morale, knowledge transfer, business process re-engineering, business operations, and change management serving as mediating factors for ERP implementation. Measuring the success of ERP implementation requires an organisation to consider the quality of information possessed, the quality of the system to be adopted, the impact of employees on the system, and the organisational impact (Sedera & Lokuge, 2019).

While previous studies have explored the types, layers, and life cycle phases of knowledge management, no research has investigated the correlation between KM and ERP implementation in the public sector (Jayawickrama et al., 2019). KM is a critical driver for the successful implementation of ERP systems, and understanding its relation to ERP implementation is essential.

2.13 Features that users desire to be included in a good enterprise resource planning system

The following are features that users desire to be included in a good ERP system:

a) Business Intelligence (BI): ERP systems are essential in today's business world, and organisations look for features that can help them remain competitive. In this section, we will discuss the features that users desire to be included in a good ERP system.

One of the features that users want in an ERP system is BI. BI refers to the software's ability to transform raw data into meaningful metrics that reflect historical, current, and predictive business operations and performance (Mariani et al., 2018). This user-oriented process allows managers to expedite and rationalise the decision-making process by extracting, exploring, interpreting, and analysing data. ERP solutions with integrated BI modules provide dynamic reports that users can access anytime for reference.

The main benefit of BI is its ability to give an organisation real-time access to data, enabling managers to make intelligent decisions in the short and long terms (Queiroz-Sousa & Salgado, 2019). With the use of dashboards, managers can make decisions based on real-time analysed data. Odoo is an open-source ERP software that is currently integrated with the BI module for better analysis and real-time decision-making, providing robust analytical capabilities such as access to reports and dashboard management with advanced analytical features that allow users to view data from diverse sources. OLAP (OnLine Analytical Processing) is another frequently used system based on multi-dimensional databases that are described as tubes (Queiroz-Sousa & Salgado, 2019). The dimensions are the systematic hierarchy in which an organisation stores its data. For example, the time dimension may be divided into years, months, and days. OLAP cubes are supplemented by data from transaction systems.

Business intelligence complements ERP software's performance by breaking down silos between essential functions like finance, HR, operations, and sales

(Queiroz-Sousa & Salgado, 2019). It also plays a significant role in drawing data from multiple sources into more than the sum of their parts, drawing on operational data from the ERP system and advancing it into actionable insights that directly serve the business's strategic ambitions.

b) *Data aggregation and analysis*: The ERP system is well-known for its capacity to produce large amounts of raw data quickly, saving organisations in financial terms (Chaushi et al., 2018). The integration of ERP with BI allows businesses to derive detailed insights from their data directly within their ERP platforms. Data aggregation is a process whereby data is collected and represented in a summary format, which can be used for various purposes such as statistical analysis for tracking performance against annual targets (Grobler-Debska et al., 2021). ERP then presents the data in a summarised format that was searched, collected, and presented in a report to achieve specific business objectives or processes, and/or to conduct human analysis for better decision-making and performance review. This exercise can be conducted quarterly, bi-annually, or annually using specialised software.

   Data warehousing is a critical aspect of this process as it helps to make decisions based on vast amounts of raw data from the entire organisation, rather than just a portion of a specific sub-department. As a result, organisations can better forecast future trends, aid in predictive modelling, and accurately predict future performance (Domagała et al., 2021). This exercise is essential for organisations to utilise their data effectively and efficiently, providing a competitive edge in the market.

c) *Customisation*: The third desirable feature of an ERP system is customisation. Customisation involves modifying the software code to better suit an organisation's specific needs (Wang et al., 2022). However, customisation requires human labour and leaves virtually no room for error, as it must be done correctly for an ERP system to benefit an organisation. When the ERP system is well-integrated, each team in an organisation generates the necessary reports and dashboards to meet their sub-division objectives while working towards a common organisational goal.

Off-the-shelf software licences belong to the software company, making it almost impossible to customise, and requiring ongoing subscription payments to utilise the ERP system (Wang et al., 2022). Thus, an organisation should consider purchasing a custom-created platform with its licence, allowing them to continually adjust and add new features to personalise the software as needed. This approach enables organisations to have complete control over the ERP system's features and functionality, leading to more effective and efficient operations.

d) Predictive capabilities: An intelligent combination of real-time data with planning, forecasting, and simulation data allows ERP to identify and respond to both future risks and opportunities faster than its competitors in the market (Gupta et al., 2018). This results in more efficient and intelligent processes and opens new possibilities for future organisations. In light of the global pandemic caused by COVID-19, ERP has helped organisations navigate through the challenging times and keep their businesses moving forward, providing the flexibility to quickly respond to the ever-changing environment.

ERP's predictive analytics mechanisms help analyse customer information, people's behaviour and attitudes, and measure performance (Gupta et al., 2018). ERP systems employing data science practices generate models for real-time analytical pattern recognition, batch prediction, classification, forecasting, segmentation, text mining, data governance, and visualisation using authoring tools. All of these aid e-commerce businesses to redeploy the right product at the right time with the right people in the right place. Predictive analytics help companies to decide whom to target, how to reach out, when to reach out, and what messages and information to convey.

e) e-Commerce features: An ERP platform's prebuilt functionality is undoubtedly beneficial to an organisation, but it should not be the sole software solution (Kujala & Halonen, 2018). Vendors should provide a buying organisation with easy integration of e-commerce functionality through add-ons or modules that align with the organisation's needs (Kujala & Halonen, 2018). This prebuild allows a consistent data flow throughout the organisation, allowing it to function as one unit. Integration can eliminate smaller tasks that consume time, increase productivity, retain customers, and boost revenue. This integration guarantees repetitive task reduction, data integrity, productivity gap elimination, efficiency, business growth, better customer support and service, and improved brand loyalty (Kujala & Halonen, 2018). Decreased employee workload is achieved, leading to increased productivity instead of merely increasing sales and visibility.

f) Customer Relationship Management (CRM): CRM software and tools are particularly vital for governments to make critical information available across the entire organisation (Aljawarneh & Al-Omari, 2018). The CRM enables users to view data from the whole organisation across departments through the common dashboard. With a CRM solution, millions of clients' information is stored and accessed by authorised personnel, recording who last accessed the system (Aljawarneh & Al-Omari, 2018). The increasing demand for effective CRM solutions calls for a powerful CRM that can manage an overwhelming workload while being budget-friendly, reducing the cost of all programs (Aljawarneh & Al-Omari, 2018). In the public sector, authorised employees can easily view all client data interactions and history on the CRM. It enables organisations to deliver client needs on time, leading to a maximum number of satisfied customers (Krizanic et al., 2019). ERP, on the other hand, enables data-driven policy design, promotes innovation and intelligent processes, and is designed to rebuild consumer trust through evidence-based public policies based on data using transparency in policy design, resulting in satisfied customers and improved operational efficiency.

g) *Improve security and manage cyber risks*: he swift emergence and assimilation of new digital technologies, coupled with organisation's operations in cloud networks, has presented fresh opportunities for the efficient management of technology and organisational processes (Antonova & Georgiev, 2019). However, the consequence of these advancements has been an increase in security threats such as phishing, fraud, and cybercrime against institutions and corporations (Antonova & Georgiev, 2019).

The security of an ERP system is a vital aspect of the entire system, and it must be appropriately maintained to ensure the reliable and secure operation of the entire system since any corrupt system component will impact the entire organisation (Antonova & Georgiev, 2019). To ensure the security of an ERP system, a comprehensive ecosystem should be established that comprises several different layers with complex dependencies and relationships between them rather than being treated as a summary of the security of its components (Stankov & Tsochev, 2020).

User identity and rights management is an integral part of the overall security of the ERP system, which allows the system to track the last user into the program and the actions taken. The security of an ERP system evolves with the challenges of increased users and traffic, severity, and complexity of security threats presented in the digital world, rather than being static (Stankov & Tsochev, 2020). Regular audits, risk assessments, and reviews should be carried out to ensure that systems are adequately maintained (Gupta et al., 2018).

h) *Add-on facilities:* When an organisation decides to purchase an ERP, it should consider selecting a software component that provides additional capabilities to expand and integrate with the base package offered by the ERP vendor. These add-on modules can be procured from different vendors, which is considered a competitive approach (Ruivo et al., 2012). Some of the modules that an organisation can add to the system include, but are not limited to:

Invoice automation: This module helps an organisation become more financially savvy by performing real-time calculations that provide more valuable insights than

general accounting can. It also tracks the movement of finances in and out of an organisation and the user who generated or paid that invoice (Mladenova, 2020).

Supply chain management (SCM): SCM modules, such as Microsoft Dynamics, can capture real-time data to identify and correct disruptions at any point, making it possible to make informed decisions, plan for future demand, and forecast trends (Akkermans et al., 2003). As keeping accurate track of the comings and goings of inventory can be extremely difficult, and human capabilities may be limited, integrating an SCM module into an ERP system is crucial.

Inventory management: This is a simpler ERP add-on that focuses on the flow of goods into and out of a warehouse, which is an alternative to SCM as an inventory management module (Zhao & Tu, 2021). Inventory management provides users with a real-time stock number to optimise their warehouse space and includes other features like stock level tracking and inventory receipt processing while saving them time.

Human resources management: The HR management module is a critical module to add to ERP. Like SAGE, this module helps an organisation collect vast amounts of complex data across every department in an organisation and correlate them (Zhao & Tu, 2021). This can help with skills audit, job advertisement up to selection and recruitment, employee performance tracking and review, and payment of the correct incentive based on the correct data. With this add-on, it becomes easier to attain accurate insights, facilitate inter-departmental data sharing, compile specific data reports, and manage personnel records and employee leave entitlements.

2.14 The importance of knowledge management during enterprise resource planning system implementation

Jayawickrama et al. (2019) have highlighted that KM is an essential aspect of ERP systems implementation, and organisations must ensure its comprehension and application, although it can be a demanding task. A thorough understanding of ERP system functionalities and configurations is required to implement the system effectively within an organisation and to reap its business benefits. Avikal et al.

(2021) have identified that managing knowledge effectively, which resides in various stakeholders, including experienced implementation consultants and the organisation's users and stakeholders, is a crucial factor for ERP project success. Jayawickrama et al. (2019) have explained that implementation consultants have knowledge of ERP system functionalities and configurations, while organisation staff members possess knowledge of business processes and industry-specific information. Therefore, discovering innovative methods, techniques, and best approaches that can integrate such knowledge among staff members and across stakeholder groups is crucial.

If KM is implemented carefully during ERP system implementation in an organisation, it has immense potential to simplify the implementation process and provide synergistic effects in the form of advanced usage of ERP, enabling the organisation to gain a competitive advantage in the market (Chaudhry et al., 2006). Further studies are required to comprehend the precise benefits that can be derived from the alleged integration processes between KM and ERP, as well as the processes that must be followed during implementation. This study aims to contribute to this by analysing the blended ERP implementation project stage from a KM perspective.

The term "organisational context" has gained increasing academic attention due to the rapid growth of technology and innovation worldwide (Kling, 2000; Morris & Venkatesh, 2010). Organisations must recognise the link between their social and technological environments, known as the "socio-technical approach," and understand that these environments may affect them differently depending on their location compared to their competitors (Aymen et al., 2020). An organisation's technological behaviour impacts its clientele, which can affect their performance and attitudes. However, the main issue identified in previous literature is that organisations are often eager to adopt standardised systems, disregarding their socio-technical challenges, which require a tailor-made system to match these challenges.

To gain a competitive advantage in the market, organisations should treat their knowledge as an asset (Chaudhry et al., 2021). Implementing a complex system

such as an ERP requires detailed knowledge management (Samiei & Habibi, 2020), including knowledge of business practices, ERP system functions and features, system configurations and maintenance, implementation methodology and user licences, and business requirements and integration. An organisation can generate new knowledge types by reviewing client needs and evaluating its service to its clients, the KM lifecycle, knowledge types, and the ERP implementation context. Therefore, KM is an essential component for creating, transferring, retaining, and applying ERP knowledge to the appropriate employees, departments, and sub-departments at the correct time during ERP implementations (Jayawickrama et al., 2019). Further research is required to understand the benefits of integrating KM and ERP and the necessary processes for implementation, which this study aims to contribute to by analysing the blended ERP implementation project stage from a KM perspective.

2.15 Benefits of knowledge management application in enterprise resource planning systems implementation

Organisations seek the advantages provided by ERP software, which include instant access to transactional information across the corporation and prompt retrieval of stored information that is not easily removed from the cloud due to installed firewalls (Jayawickrama et al., 2019). The rich information from KM allows organisations to reduce cycle times from weeks to hours, scale back useful data resources across multiple units/departments/plants, improve customer satisfaction by order of magnitude, and enable public sector organisations to make prompt payments to their outsourced stakeholders and deliver services quicker (Jayawickrama et al., 2019). ERP implementation solutions translate to increased profitability, increased market share, and competitiveness, as well as successively larger market capitalisation for an organisation. Motwani et al. (2005) have noted that whether related to financial, management, or operational processes involving internal tasks, or those related to customers or suppliers, ERP systems should be implemented using the KM that an organisation preserves, so that it contributes significantly to improving business competitiveness.

Enterprise resource planning involves the latest technology innovations that manage connections and integrate business and management processes within and across an organisation's basic internal systems, sub-systems, and/or processes (Tamimi & Jebreen, 2018). The contemporary global economy emphasises the proficient use of human intellectual capital and technology to integrate processes, support enterprise strategies, optimise resources, and create a competitive advantage (Samiei & Habibi, 2020). Motwani et al. (2005) have observed that ERP seeks strategic integration of functions and stakeholders into a customised system to streamline operations, build superior service delivery value, and prompt response to community or customer needs.

This study observes the ERP benefits framework theory of Badewi et al. (2018) as explained in the subsections that follow.

2.15.1 Operational benefits

The following are the operational benefits of an ERP system:

a) Reduction of inventory costs

To reduce inventory costs and save money, organisations can use ERP inventory management systems, which require integrated decision-making between an autonomous organisation's management structure and its board of directors, with effective decision knowledge sharing between management and their subordinates (Badewi et al., 2018). Appropriate knowledge sharing is crucial to success, as it helps to identify which decisions have the most significant impact on overall performance. KM can be used as an effective approach to achieving knowledge sharing and decision synchronisation in the supply chains of any organisation, making sure it helps an organisation save money. The ERP system provides intelligence about the inventory the company holds and how it manages that inventory. This works whether the company uses First-in-first-out (FIFO) or Last-in-first-out (LIFO) system.

According to Shukor and Sheikhi (2020), an ERP system allows users to see in real-time exactly the inventory levels they have. It can be configured to automatically

alert them when their stock falls past a certain level, when it needs to be topped up, or how fast it sells to retail. Businesses save time because they do not need to check stock levels; they only need to monitor the alerts.

Excessive inventory stored in the warehouse can reduce liquidity and increase the overheads of an organisation. This is why KM is important when implementing an ERP system; it helps avoid forecasting too conservatively, which may lead to inventory shortages as well (Shukor & Sheikhi, 2020). Seasonal products add another layer of complexity to inventory cost management. The ERP may help monitor supply and demand patterns. Erkayman (2019) stated that ERP systems can analyse historical sales data and past seasonal trends to set realistic safety margins.

b) Avoiding dead stock

To create trackable records, ERP systems use SKU numbers, expiry dates, units of measure, serial numbers, lot numbers, and attributes, according to Salomonsson (2021). Inventory management feature integrated within the ERP can make the organisation's processes easier by providing easy-to-use tools to track inventory levels in real-time. It helps organisations to identify slow-moving and dead stock, allowing them to take the necessary action. Effective knowledge management is critical in this process, as it enables the ERP system to monitor expiring and slow-moving items. An efficient ERP Inventory Cost Management alerts organisations in time about stock expiry so that loss-limiting action can quickly be taken. The system also makes buyers aware of slow-moving costly inventory items, enabling organisations to keep stock levels as low as possible on those lines.

c) System cost savings

According to Gill, Amin, et al. (2020), an efficient ERP system leads to cost savings by managing various parts of the business simultaneously, reducing overall staff workload and costs, and minimising system expenses. An ERP system integrated with knowledge management automates daily tasks, which increases production and improves output accuracy. Barth and Koch (2019) argued that the balanced scorecard can measure the potential monetary value of policy coordination, promote

cooperation, and minimise the total supply chain system cost. The implementation of an ERP system is expected to improve day-to-day operations in the short term, including better inventory control, improved cash management, and reduced operating costs.

d) Warehouse efficiency

Wankhede et al. (2021) found that appropriate knowledge management enables organisations to interact with suppliers, service providers, and stakeholders, and that ERP system implementation teams add key attributes to their products, making them warehouses of their business. This system streamlines aspects of administration and warehouse management by providing information about the location of items in the warehouse, storage requirements, sales levels for each inventory item, and instructions such as special handling requirements. The benefits of warehouse efficiency that ERP adds to any organisation are improved effectiveness with better decisions, efficiency using fewer inputs to achieve the same outputs, improved performance, and improved staff morale to give more cooperation and incentives. These can be beneficial features in the ERP when an organisation holds a thorough knowledge management that aligns with warehouse management.

e) Customer service level improvement

Properly aligned knowledge management to ERP systems helps with inventory management by preventing excess stock holding while avoiding unexpected out-of-stock disappointments (Sumner, 2018). By assessing fast-moving and seasonal surges in demand, an organisation is best prepared to deliver to the customer as and when required, closing the gap between lost sales or disgruntled customers and complaints due to out-of-stocks (Sumner, 2018). Tracking stock items by buyer also helps identify top-tier customers per line, giving an exact idea of which items are purchased the most. This assists in demand planning and relationship building, which the ERP is exceptionally good at. The ERP system keeps track of the available and inbound stock to ensure that customers receive up-to-date and accurate information on availability and can track their orders.

f) Supply chain transparency

In today's business environment, organisations often outsource their stock and logistics to third-party providers to shift risks and insurance costs. These providers are commonly known as 3PLs, TPLs, or shipping providers and offer stock, warehousing, and shipping solutions. An ERP system that is informed by KM can effectively communicate stock, ordering, and shipping information with an organisation's logistics suppliers in real-time. This feature can be achieved when properly integrated into inventory cost management, allowing an organisation to link to external trade partners (Banerjee, 2019).

SCM is founded on the idea of having the right product at the right place, at the agreed price, at the correct time, and in the right condition (Banerjee, 2019). Customers expect to receive the correct quantities, sizes, and colours when purchasing products. By using ERP systems that are integrated with KM, an organisation can synchronise the entire supply chain and provide timely information to all supply chain partners to assist their decision-making and eventually achieve customer satisfaction. Keeping customers updated about their shipments every day increases customer loyalty and satisfaction (Banerjee, 2019).

2.15.2 Managerial benefits

These are the managerial benefits of an ERP system:

a) Better resource management

When an ERP system is integrated with KM, executives and business owners can easily identify areas of the business that need improvement or expansion, as well as those that require restructuring (Pang et al., 2019). The more employees have access to the ERP that is informed by KM, the more likely they will be able to identify problems and react quickly to them, whether it is a surge in demand for a certain product, delayed shipments from a supplier, or an impending cash flow crunch, which will help in detecting delivery delays and notifying customers in time.

Employees can proactively address the issue to the extent possible when an organisation considers user uptake of the system (Pang et al., 2019). By using information fed by the ERP system, executives can shift their focus on the product to achieve objectives such as increasing efficiency, reducing costs, and responding to changing consumer needs or market conditions, all in the name of retaining KM. Since workflows and information are in one place and visible to users, employees can see the status of projects and the performance of different business functions relevant to their jobs. Kushwaha et al. (2022) noted that this is deemed valuable visibility to managers and leaders of an organisation, which is by far faster and easier than searching for the right documents and constantly asking colleagues for updates or going through piles of files.

b) Improved decision-making and planning

An attractive feature of an ERP system is that it consolidates all business activities, such as manufacturing, human resources, finance, supply chain, finance, audit, monitoring, evaluation, etc., and incorporates best practices to automate and greatly reduce costs, providing improved chain management (Barth & Koch, 2019). Because an ERP system can access data from across the corporation as instructed by the executive's KM of all the sections and subsections of an organisation, these systems can uncover impactful trends, provide extensive business insights, and make strategic decisions on the most viable trends that bring in more business. This results in better decision-making by organisational leaders who now have quick access to all relevant data.

c) Performance improvement

Jenab et al. (2019) emphasised the importance of effective KM for the successful application of an ERP system designed to improve reporting quality. The ERP system sends feedback to users to ensure that they enter the required information correctly, eliminating risk, loss, and credibility based on audit results. ERP is highly effective in managing business operations while maintaining consistency, and enterprise data collection and analysis are simplified by the ERP system, as it is tailored to the information reports need to provide (Jenab et al., 2019).

ERP systems can also improve processes and forecasts through system learning and predictive analytics by employees. Learning from experience and adaptation rules can help save time and improve planning for business operations (Jenab et al., 2019). Alam and Uddin (2019) further stated that an ERP system can create a management system that optimises operations with short production times, reduces costs and waste, accelerates capital turnover, maximises profits, and improves the quality of products and services while increasing employee satisfaction in terms of performance reviews. Moreover, the ERP system ensures that company performance bonus payments are paid to the right employees while providing the necessary support to ensure the effective implementation of the ERP system (Jenab et al., 2019).

2.15.3 Strategic benefits

The strategic benefits of an ERP system are as follows:

a) Support for business growth

Rodriguez et al. (2019) proposed an e-business model that promotes harmony over three critical business aspects: customer and/or market interaction, asset sourcing, and overall knowledge leverage, supported by a robust information technology platform. Nowadays, organisations, especially during the COVID-19 pandemic, realise the need to form alliances with their customers, partners, and suppliers over the Internet. Hence, e-business integration with ERP systems becomes a critical aspect (Tarigan et al., 2021). With a strong establishment of KM and technologies, companies have the opportunity to build interactive relationships with partners, stakeholders, and suppliers, improve efficiency and extend reach, track their creditors and debtors on time and deliver as expected. Because an ERP system can eliminate inefficiencies, wasted time, and wasted resources, it can empower an organisation to thrive and flourish.

b) Support for business alliance

Badewi et al. (2018) suggested that a CRM strategy supported by the business-to-business (B2B) model could yield more efficient marketing campaigns, increasing

customer responsiveness and sales. Although CRM days have lapsed within the business world, the ERP has appropriated and does the same service if not less. On the other hand, Kutnjak et al. (2019) indicated that enterprises often participate in cost and price-focused activities associated with supplier alliances, during which information sharing, an organisation's strong KM, and knowledge technology play a significant role. Strategic business alliances are a new concept in the business world, and most organisations have not fully understood it. They are designed to integrate organisations with distinct cultures, values, and processes into a fluid, productive, and non-adversarial system of putting together a solid work (Bali & Sinha, 2020). To achieve a successful business partnership, a strong KM and strategic alliance should consider strategic planning, communication, efficient and effective decisions, performance evaluation, relationship structure, and education and training (Mandal & Gunasekaran, 2003). This suggests that a successful alliance relationship could hardly be kept without an honest system that would efficiently support the interactions among the allied organisations.

c) Building business innovations

According to Hasan et al. (2019), a properly implemented ERP vision that utilises KM is likely to provide an "enterprise-wide view" of business software, facilitating internal integration of the technical and business core, as well as external integration with business customers and stakeholders. Therefore, successful innovation with an application of KM to ERP implementation should rely on having both the appropriate implementation knowledge and the correct adoption know-why. Additionally, since the decision to adopt logically precedes the choice of an implementation approach, having the right adoption know-why should aid in obtaining or fostering the correct implementation knowledge.

d) Building cost leadership

Every organisation has a business strategy aimed at leading the company to success and accomplishment. To achieve it, the organisation must have a sound strategy to gain a competitive advantage in the market (Kiran & Reddy, 2019). In the world of technology, strategies and the business environment are changing. Therefore, organisations have developed a technological strategy to stay ahead of their competitors and combined their businesses with sustainable development.

The ERP system, which is derived from an organisation's KM, can establish a lean structure with streamlined processes based on the principles and working processes. This is the way that organisations eliminate waste, and Kiran and Reddy (2019) suggest that the goals of lean production are the highest quality, lowest cost, and shortest lead time. Lean production can be viewed as a philosophy, tool, and practice for the continuous improvement of operations. By using an organisation's KM while implementing the ERP system, companies can achieve economies of scale by increasing production and lowering costs. This happens because costs are spread over a larger number of goods (Albertus & Ngwenyama, 2020). Organisations focus on consolidating all departments and sub-departments into one system by using ERP, saving them time implementing various systems (Goldston, 2019).

e) Generate product differentiation (including customisation)

Zaman et al. (2019) have shown that ERP systems present organisations with an opportunity to achieve competitive differentiation in the market by customising services and/or products for individual users at a lower cost while maximising profits. ERP systems involve business operations for both internal and external integration capabilities; this could assist an organisation in achieving the strategic benefits that will give it a competitive advantage. Installing ERP systems, using the KM that an organisation possesses, may be a trend to accelerate organisational resources integration and strengthen the competitive superiority and operational efficiency of the corporation.

f) Build external linkages (customers, stakeholders, and suppliers)

KM helps organisations build better and faster communication channels with suppliers, distributors, and related business parties, which helps build a stronger and more relevant ERP system (Banerjee, 2019). This is because all the communication records are kept on the cloud, and each transaction on orders is updated from the manufacturing to the receipt stage. All parties are conscious of the movements of their orders. Banerjee (2019) highlighted the necessity for an open system to make information available to supply chain trading partners. The rationale for this gap is that ERP primarily improves internal organisation operations but hardly impacts anything outside an organisation. Thus, as a software package, ERP continues to evolve, becoming either an add-on or a renewed system, particularly with cloud technologies and analytics, but still lacks connectivity across its stakeholders outside an organisation if not implemented using an organisation's KM.

g) Enable business expansion

As a business grows, the need to streamline and automate processes becomes increasingly important to avoid excessive costs (Sumner, 2018). KM can help build an ERP system that manages areas such as inventory cost management as part of a wider integrated business function matrix, serving as a useful tool in controlling the business as it expands. Without analytical tools, businesses may make incorrect assumptions about the future (Sumner, 2018). Organisations should continuously evaluate new business ventures or reorganise business units as part of a larger corporation. It is crucial to consider the role that the ERP system can play and recognise the importance of implementing a successful growth management strategy.

The fact that ERP is hosted in the cloud allows Small, Medium, and Micro Enterprises (SMMEs) to take advantage of integral tools to help them leverage more opportunities. While the excitement of manufacturing growth may come with new challenges, ERP empowers users to take an initiative-taking approach to business expansion.

2.15.4 Information technology infrastructure benefits

The following are the IT infrastructure benefits of an ERP system:

a) Build business flexibility for current and future changes

ERP helps streamline business processes by providing complete visibility of functions by making all data available in a centralised location (Kiran & Reddy, 2019). KM assists every division and sub-division of an organisation with data that monitors, enhances, and streamlines business processes and figures out shortcomings as soon as they happen. The useful feature of ERP is to automate production by reducing dependency on manual labour using the data fed by KM. It reduces manual errors and accelerates the production process, leading to faster outputs (Kiran & Reddy, 2019).

The competitive dynamics and the pace of change are so quick that most companies do not know what their business models are going to be within the next two to three years. This suggests that businesses need software solutions, which include ERP, that are flexible and permit business agility to satisfy an organisation's current and future needs. This is particularly vital as a business that is not agile or is constrained by its resource planning software will quickly become irrelevant in the market.

b) Reduce information technology costs

ERP offers a crucial benefit over other software by consolidating core business processes, eliminating the need for multiple systems across various departments and locations, and making these capabilities accessible to everyone in the organisation (Ghazaleh et al., 2019). The goal is to streamline processes and enhance information sharing across the organisation, regardless of its size, resulting in increased productivity, automation, and reduced personnel required for a given task. This feature reduces overall operating costs, making it easier to grow the business.

Implementing an ERP system through KM helps centralise business processes, leading to time and cost savings, especially in terms of IT costs. Ghazaleh et al.

(2019) found that organisations should avoid maintenance costs, maintenance time, and direct or indirect labour costs. Legacy business systems often undermine scalability options, especially in terms of time and cost. An ERP system, when implemented with KM, eliminates the need for separate programs for each departmental function, which can be complicated and costly for larger organisations. It also reduces additional spending on software and hardware systems, and eliminates the need to disrupt routine workflows when these systems need to be upgraded, patched, or replaced.

c) Increase in information technology infrastructure capability

ERP is cloud-based, which minimises the cost of access and requires less information technology support and maintenance. Ghazaleh et al. (2019) emphasised that KM is particularly essential when implementing ERP systems as it is at the top list of enabled business innovations. KM enables ERP systems to access reliable information, avoid data duplication in the database, reduce adoption and cycle time, save costs, improve scalability, and require less maintenance. Cloud-based software is cost-saving and provides initial introduction cost, workforce cost, usability, efficiency, scalability, and flexibility for an organisation while easing control of the information flow. ERP can perform all of an organisation's functions at once, including accounting, data analysis, HR, customer relations, and function integration, such as producing reports.

2.15.5 Organisational benefits

An ERP system has the following organisational benefits:

a) Support organisational changes

During the implementation of ERP across an organisation, it is important to manage both change management and project management. Change management refers to the processes, tools, and techniques used to manage the human side of change and achieve the desired business outcome (Aremu et al., 2021). Effective ERP organisational change management requires consideration of cultural changes and protocols for job performance. The traditional ways of performing tasks should be discontinued when adopting the ERP system.

Serhan and El Hajj (2019) studied the antecedents of ERP system implementation success and highlighted the importance of KM, knowledge transfer, knowledge sharing, and communication within an organisation during times of change, as employees are often uncertain about their positions during these changes. However, resistance to change or lack of awareness regarding expected changes often causes employees to have difficulty adapting, especially in union environments and organisations with highly senior employees (Epizitone & Olugbara, 2019). To address workforce transition to the new ERP system and determine who will be super-users and trainers, change management plans must be developed alongside a proper training schedule.

b) Facilitate business learning

ERP systems are chosen by organisations to improve business operations, integrate different disciplines, and increase understanding of business processes (Zabukovšek et al., 2018). The primary goals of an organisation's ERP system include acquiring ERP system skills, training all employees, users, and stakeholders to use the system, and integrating information technology into the business (Serhan & El Hajj, 2019). By gathering and organising data into actionable analytics, ERP systems provide business intelligence, which can give better insights into a company's financial position and assist executives in making informed decisions.

cThis significant business advancement results in increased capital and fosters a culture of visibility and trust within the company.

c) Build a shared vision

Hammami and Alkhaldi (2021) argue that a business vision is a broad expression of an organisation's overall purpose, the short- and long-term goals of the business plan, and the expectations and values of key stakeholders, including suppliers, partners, and customers. ERP is commonly used by companies to align their business vision with their desired outcomes and achieve their goals (Reitsma & Hilletofth, 2018). The most common reasons for adopting ERP today include gaining a strategic or competitive advantage and improving customer service and accuracy, which align with the goals and vision of the business. However, not all organisations can articulate their IT adoption strategy in line with their overall business vision (Bekhet & Sofian, 2018).

Barth and Koch (2019) suggest that ERP is not just an IT system for acquiring companies; it primarily involves knowledge management to be successful. Organisations need a clear understanding of how ERP adoption will impact their business vision and goals (Sumner, 2018). An adopting organisation should recognise the importance of clarifying their knowledge management and strategic intent before embarking on ERP implementation (Reitsma & Hilletofth, 2018). This way, they can better understand the system and its alignment with the organisation's vision.

d) Improved information efficiency within an organisation

Proper introduction of employees to the new ERP systems can influence their attitude towards change and reduce resistance to the system. Ullah et al. (2020) emphasise that the introduction of an ERP system should be done after building and sustaining a positive outlook among potential users. The executives' main task should be to build all employees' approval of the ERP project and foster an optimistic attitude towards it (Chatti & Zaghdan, 2021). To be accepted and approved, the system should show all the benefits that the older system lacked.

Baskaran (2018) discusses the taxonomy of players and activities across the ERP project lifecycle in detail.

e) Integration of information

According to Wijaya and Utomo (2021), the exceptional advantage of ERP is the integration of all division and sub-division data and processes. The best integration that supports administrative and operational functions is obtained from KM. However, implementing ERP usually entails business re-engineering, which can cause significant organisational change, especially when KM interferes with traditional practices followed by staff members reluctant to accept changes (Alhuthaifi, 2018). The misalignment between KM, ERP features, and organisational requirements may lead to fruitless expenditure and more costly projects that do not benefit an organisation.

f) Improving operation and execution

Sumner (2018) emphasises that successful implementation of an ERP system should lead to considerable benefits for firms entering the e-business field. However, previous studies have shown a high failure rate of ERP system implementation, which has deterred potential users from utilising this important e-business tool, as well as a failure to integrate ERP into KM. The execution of the project is not typically an easy part of the implementation, leading to organisational frustration and aborting the ERP before it works. The primary objective of ERP should be to create an effective database in which accurate information on purchasing, production, and sales activities becomes available online, making it easier to do business (Lugaresi & Matta, 2018).

ERP that is correctly executed for an organisation should meet the following competencies (Kemei et al., 2018):

- *Completeness*: The system should record complete organisational data, with no missing or redundant data, and integrate all departments and sub-departments' data.

- *Coincidence*: The data recorded in the system should match the actual data that an organisation uses.
- *Timeliness*: Real-time recording of any data is required in processes so that the produced information is relevant.
- *Reliability*: Ensuring the system is safe and dependable and all the required maintenance-related functions are performed punctually to avoid delivery delays.
- *Logical consistency*: The system should have no logical errors in data used to avoid inaccurate outputs.

g) Reduction of fraud

According to Amalnik and Ravasan (2018), the implementation of ERP systems significantly reduces the risk of fraud by rejecting all non-compliant invoices during the first input, in addition to requiring all relevant documents and financial reporting errors. ERP systems improve the ability of organisations to assess and manage risks related to privacy violations and provide a better mechanism for assessing and managing these risks before they become audit findings, leading to reduced risks. The adoption of ERP systems has shifted the overall focus in the internal audit function, whereby internal auditors spend less time on crisis management and problem resolution and more time ensuring that internal controls are functioning properly (Amalnik & Ravasan, 2018). Moreover, the adoption of ERP systems has led to an improvement in the internal auditor's capabilities for risk assessment across all categories, including user training, with the greatest improvement in assessing risks related to HR and procurement (Cardoni et al., 2020). The adoption of ERP systems can effectively reduce financial risks while improving an internal auditor's ability to assess and manage these risks, such as liquidity and credit risks.

Table 2.2: Benefits of the ERP system for an organisation

	BENEFITS	REFERENCES
OPERATIONAL BENEFITS	Reduction of inventory costs Avoiding Dead Stock System Cost Savings Warehousing Efficiency Customer Service Level improvement Supply chain transparency	Shukor and Sheikhi (2020) Erkayman (2019) Salomonsson (2021) Baskaran (2018) Barth and Koch (2019) Chang (2020) Waters and Waters (2013) Sumner (2018) Banerjee (2018)
MANAGERIAL BENEFITS	Better resource management Improved decision-making and planning Performance improvement Better knowledge transfer Better change management decisions	Moh'd Anwer (2019) Kushwaha et al. (2022) Barth and Koch (2019) Chapman and Kihn (2009) Rizza (2016) Song and Sun (2018) Ghosh, Satyawadi, Prasad Joshi, & Shadman, (2013).
STRATEGIC BENEFITS	Support business growth and re-engineering Support business alliance Build business innovations. Build cost leadership Generate product differentiation (including customisation) Build external linkages (customers, stakeholders, and suppliers) Enable business expansion. Improved staff motivation Better resource allocation	Amit and Zott (2001) Badewi et al. (2018) Arcara et al. (2019) Gupta et al. (2018) Häckel et al. (2018) Rouhani and Mehri (2018) Bryson and Sullivan (2003) O'Kearney (2007) Shang and Seddon (2000) Banerjee (2018) Shang and Seddon (2000)
INFORMATION TECHNOLOGY INFRASTRUCTURE BENEFITS	Build business flexibility for current and future changes Information Technology costs reduction Increased Information Technology infrastructure capability	Ash and Burn (2003) Payne (2002) Beatty and Williams (2006)
	Support organisational changes Facilitate Business Learning Built common visions	Alshare, El-Masri & Lane (2015). Almajali, Masa'deh & Tarhini (2016).

	BENEFITS	REFERENCES
ORGANISATIONAL BENEFITS	Improved information efficiency within an organisation	Finney and Corbett (2007) Zabukovšek et al. (2018) Hepner and Dickson (2013) Davenport (2000) Markus and Tanis (2000) Al-Shamlan and Al-Mudimigh (2011) Shanks, Parr, Hu, Corbitt, Thanasankit & Seddon (2000). Motwani et al. (2005) Robertson and Perera (2002) Hong and Kim (2002) Aloini et al. (2007) Debreceny et al. (2005)
	Integration of information	
	Improving operation and execution	
	Reduction fraud	

Source: Badewi et al. (2018)

2.16 Competitive advantage with enterprise resource planning system

The implementation of ERP systems, with their features and capabilities, can help organisations achieve a competitive advantage and exploit the resulting data (Alonso et al., 2018). These systems enable organisations to quickly respond to market demand and gain an advantage over competitors whose systems are traditionally customised. The vendor's ability to provide real-time user support and maintenance is critical to the success of the implementation. Martin Riche, Director of the ERP Competence Centre at Boeing Commercial Airplane Group in Seattle, noted that the most significant advantage of packaged applications like ERP is the ability to move with the state-of-the-art technology. ERP systems shift the focus of an organisation's personnel to focus on service delivery and core business rather than worrying about the systems used.

a) *ERP improves productivity by linking best practices to ERP system modules to achieve better efficiency for existing processes.* ERP can improve an organisation's business performance by developing the most efficient way to plan and schedule resources, and optimising productivity (Jenab et al., 2019). This is accomplished through workflows that streamline business processes, carefully track employee performance, and analyse results, making it easy for organisations to monitor and evaluate the system. The dashboard allows users to see which parts of their processes are most productive and which need

improvement, resulting in increased data visibility. This strong advantage of ERP allows users and vendors to view data in real-time, improve relationships, and address customer needs.

b) *A correctly implemented ERP system can help managers retrieve suitable information in real-time, enhancing the decision-making process.* Berić et al. (2020) noted that the ERP system has enabled organisations to improve their production processes, monitor and control them better, and provide all real-time information important for decision-making. This has resulted in improved business processes and simultaneous control over all elements of the process. An independent system is not sufficient as decisions may not be made instantly, and problems may not be solved in real-time.

c) *ERP enables managers to make quick decisions by responding to market changes in parallel with the management of activities and information.* ERP has the advantage of providing useful data at the time of decision-making, covering all important aspects of an organisation by using a single database that gathers data from various sources and displays it in the desired format (Alaskari et al., 2019). The difference between manual and ERP processes is the capability of manual processes to provide outdated information to the management, leading to inaccurate decision-making. ERP guides the management in making decisions based on updated, accurate, and complete reports that are consolidated and available in real-time.

d) *A well-implemented ERP system rapidly delivers a comprehensive set of interrelated data and information to decision-makers, enabling them to decide on a suitable competitive strategy, whether low-cost or differentiation advantage.* If the ERP system is implemented efficiently and effectively, it becomes the most valuable and strategic tool an organisation can deploy to deliver a significant competitive advantage by improving business information and visibility, decreasing operational costs, improving economic management, inventory management, and organisational communication (Tarigan et al., 2021). ERP solutions help manage, control, audit, and streamline business information using a system integration strategy for an organisation. Wamba et

al. (2018) predicted the global ERP market to reach $41.69 billion by 2020 if the potential value and benefit of ERP are well understood. The market generated approximately $95.37 billion globally in 2021, which exceeded expectations.

e) *Implementation of ERP improves organisational and operational functions (Elgohary, 2019) and influences subsequent decision-making (Sarkar et al., 2022), while also supporting an organisation with human resource skills and knowledge.* One of the benefits that the human resources department of an organisation enjoys is the ability of ERP to provide a centralised database (Elgohary, 2019). A consolidated database helps managers find information easily and HR software captures data for each employee, such as name, employee code number, attendance, leave, work history, and performance appraisals from the database itself. ERP, therefore, helps management to make timely decisions and ensures that everything is streamlined and organised. Talent acquisition is enhanced by implementing an ERP as it specifies the skills required for specific job descriptions, oversees employee onboarding, training, and tracks employee performance, ensuring that the right and qualified people are assigned to specific jobs.

f) *ERP has the agility to configure and simulate changes in organisational requirements.* ERP systems are designed to help companies build agility in their business processes (Elgohary, 2019). An ERP solution automatically initiates the appropriate measures across the value chain system and provides companies with the opportunity to integrate all programs (Elgohary, 2019). This combination saves time and money while delivering a higher return on investment. This allows businesses to deliver the right information to the right people at the right time, increasing their flexibility.

Based on the benefits mentioned above, it can be suggested that organisations should implement ERP solutions to operate nimbly without delay in decision-making. Organisations commonly configure and customise packaged ERP software according to their organisational needs, conditions, and structures so that it works for their needs. Failure of the ERP to have these features may lead

to a failed project and loss of finance. The need to implement the ERP system should always be linked with organisational structures, processes, technology, and roles. Changing these systems may be difficult, uneconomical, and costly.

2.17 Risks associated with enterprise resource planning adoption

Organisations often opt for commercial-off-the-shelf ERP systems to meet their requirements, but these systems come with implementation risks (Arora et al., 2021). While ERP systems are supposed to reduce risk and improve business performance, only 10% of ERP implementations are estimated to succeed with full functionality (Arora et al., 2021). Thus, organisations need to make significant strategic and tactical decisions on whether to change the business to fit the system or vice versa to avoid risks associated with ERP adoption. Complete failures and partial failures may occur, with the former leading to scuttled projects or long-term financial damage, and the latter caused by tenuous adjustment processes for organisations that disrupt daily operations.

Xu and Han (2019) found that projects considered failures at one stage could succeed at another stage, depending on earlier rehabilitation efforts. According to a survey conducted by Xu and Han (2019), the major management problems faced during ERP implementation were project delays and cost problems, conflicts with vendors, internal conflicts, conflicts with business strategy and integration of programs, and other traditional internal systems. Implementing ERP systems is a complex and dynamic process that involves technological and organisational interactions and uncertainty. Therefore, careful administration is required to manage conflicts, changes, and employee reluctance (Kiran & Reddy, 2019) to achieve the intended benefits of ERP implementation.

Saxena and McDonagh (2020) assert that the implementation phase of the ERP lifecycle is currently the area where most vendors are striving to perfect ERP and fit it into the organisation's discipline, and this focus is linked with the challenges associated with ERP implementation. Organisations aim to improve their key performance indicators, such as proficiency, efficiency, profitability, customer satisfaction, and competitive position in the market when implementing ERP

systems (Kirmizi & Kocaoglu, 2020). Despite the fact that ERP systems are complex information systems, and their implementation is difficult and costly, there is a growing demand for them in organisations (Huang Chua & Myers, 2018). Organisations invest millions of Rands each year on ERP packages and implementation processes, spending time and resources on training during implementation, yet there is extensive evidence indicating that they experience significant problems, particularly during the actual implementation phase (Alomari et al., 2019). Studies have reported failed ERP attempts, both published and unpublished, resulting in companies losing not only the capital invested in ERP packages and the millions paid to outside consultants but also a significant portion of their business.

Mahmood et al. (2019), using a case study, identified the reasons that follow for the risks associated with ERP implementation.

a) Failure to redesign business processes to fit the software

One of the major risks associated with ERP implementation is the failure to redesign business processes to fit the software. Burgos et al. (2021) indicated that scope and requirement risks mainly stem from misunderstanding requirements, improper change management, poor estimation leading to cost and time overruns, and the lack of an effective methodology. Al Rabeay and Sherif (2019) argued that to implement an ERP successfully, organisations must redesign their current processes to fit the purchased system. However, converting off-the-shelf software into a tailor-made ERP system that fits the current processes is a time-consuming and costly endeavour that most vendors are unprepared for, making it the most significant implementation risk.

b) Product quality and vendor unreliability

Another significant risk associated with ERP implementation is product quality and vendor unreliability. Although ERP systems are becoming increasingly similar in functionality and more relevant to organisations' operations, their quality, ease of implementation, and vendor support still vary (Otieno, 2008). Additionally, even

after the release of a new version of the ERP system, its stability may not be guaranteed in terms of quality and ease of implementation. Developers are continuously modifying the system implementation by finding new hardware platforms, changing operating systems and database platforms, and altering overall system architecture to improve implementation techniques, which can result in a new version of the same system.

c) Lack of senior management support

According to Sheik and Sulphey (2020), top management support is essential for the success of any project in an organisation. Despite being available to sponsor the project, senior managers often fail to allocate time for the crucial team members for pilot testing or super-user training, or even for themselves. Super-users play a vital role in running the system and need to be trained. Senior management should support and commit to the ERP project by allocating sufficient financial and human resources. Insufficient funds may lead to ineffective knowledge transfer, as vendors may rush the implementation (Sheik & Sulphey, 2020). All staff members should be committed to the system to avoid poor business process re-engineering, widespread user resistance to change, and low user satisfaction post-implementation. Sheik and Sulphey (2020) also emphasised that the ERP implementation project must be explicitly identified as a top priority by top management. This means that top management must provide an appropriate amount of time and resources to ensure a successful implementation.

d) Insufficient training and reskilling of end-users

Investing in employee training and reskilling is a significant cost that an organisation must prepare for. This is because any ERP implementation must meet deadlines (Sheik & Sulphey, 2020). As a result, vendors may find it difficult to set aside enough time to train most of their employees and provide them with the skills necessary to reach a satisfactory performance state before the system is launched. Badewi et al. (2018) argued that communication and team-building skills among managers are crucial for a successful ERP implementation. User engagement allows providers to understand their requirements and address their concerns (Ullah et al.,

2020). By training the end-users, an organisation can acquire the skills they need to use an ERP system effectively. To ensure that users are aware of the impact of the ERP project on their responsibilities, the organisation must develop communication plans, demos, training videos, and regular reports to keep users informed (Caserio & Trucco, 2018). Users and subordinates become more receptive to the ERP project if management provides sufficient resources and is willing to support the ERP implementation. Therefore, an organisation must ensure that all users are convinced of the usefulness of the system.

e) Lack of ability to recruit and retain qualified systems developers

Outsourcing ERP implementation to service providers and developing IT teams into solution champions is a common strategy for many organisations (Gärtner & Rockenschaub, 2018). However, the market price for experienced ERP specialists is high, making it challenging to recruit and retain them. SAP, Oracle, Microsoft Dynamics, and Infor are currently the primary developers of ERP systems, and their services are in high demand and vary with each consulting project. A lack of in-house ERP specialists can be a significant risk to ERP implementations, potentially leading to inconsistencies in an organisation's operational systems. Service providers often rely on their experience from other organisations, failing to recognise that each organisation operates in a unique environment, which may result in knowledge deficiencies within the organisation. Therefore, training is a valuable resource to develop skills that are missing in-house and mitigate the risks associated with a potential shortage of skills.

f) Inability to secure employees' full-time commitment to project management and project activities

The implementation of an ERP system may cause stress and uncertainty about job security for employees, making them resistant to change (Rana et al., 2021). Staff may feel overwhelmed and under pressure to ensure the project's success after the system's adoption. It is crucial to clearly communicate the roles that staff members are assigned during and after the ERP implementation to avoid uncertainty and a lack of commitment to project management roles (Rana et al., 2021).

Asiani and Riyanto (2020) emphasise that user participation and involvement are crucial factors for successful ERP implementation. Likewise, Rana et al. (2021) suggest that not only do employees need to be familiarised with the changes that an organisation goes through during ERP implementation, but also its stakeholders should adapt to the changes to help the organisation gain a competitive edge in the market.

g) Lack of integration

The successful implementation of an ERP system requires the integration of various business processes, including feasibility analysis, requirements gathering, prototyping, and ERP functionality implementation (Kenge & Khan, 2020). In addition, extensive technical work is necessary, including enhanced configuration features and integration with other systems such as financial, supply chain, or quality software and tools. Kenge and Khan (2020) identify system integration as a major issue during ERP implementation, noting that no single application can fully meet an organisation's needs. To address this, an organisation may purchase different modules from various vendors and integrate them with other business systems to achieve a comprehensive ERP system (Kurnia et al., 2019).

It is worth noting that system integration can occur within a single organisation or across organisational boundaries, where a few organisations share a particular business process, which is referred to as external integration (Asamoah & Andoh-Baidoo, 2018). Integration into the overall business strategy is a critical

consideration during ERP implementation, as it can help optimise business processes and improve efficiency.

h) Resistance to change

During the ERP implementation process, users may become more resistant to change due to a lack of communication and knowledge of formalised business processes and ERP systems (Alieva & Von Haartman, 2019). Failure to give subordinates the chance to participate in BPR, a lack of use of the ERP system, and inferior quality of data entering the system may be the primary causes of this resistance. Middle managers, in particular, are likely to reject the ERP implementation process, resulting in end-users being reluctant to abandon the old way of working (Alieva & Von Haartman, 2019). As such, organisations must invest in resources to encourage employee participation in the change and mitigate the severity of resistance. Change management activities should be prioritised from the beginning of an ERP project to full system implementation, including activities that facilitate rethinking and changing daily work processes. Failure to adapt to change can be a formidable obstacle, and successful implementation requires buy-in from senior management and stakeholders from all departments and sub-departments, particularly early in the implementation process. Ensuring that all users receive extensive training is crucial. Management support is necessary to pave the way for vendors to implement the system successfully.

i) Poor technology planning

When implementing new software, a lack of adequate technical expertise and infrastructure to support project requirements is a risk factor that can lead to application complexity, new project scope, new users, and technology failure to meet specifications, posing a significant financial risk for an organisation (Kohansal, 2019). Kohansal (2019) emphasises that a lack of adequate technical expertise and infrastructure may contribute significantly to escalating time and cost overruns and may cause the rejection of the entire project by the organisation.

j) Security risks/data security

Sharing data storage and processing among tenants in cloud ERP can pose significant security risks (Mahmood et al., 2019). Data access protection is critical for cloud ERP security, and organisations should prioritise it. Ensuring the security of an organisation's data from unauthorised access, use, and disclosure is always a top priority. Compared to traditional IT and ERP systems, cloud ERP has more threats and security risks due to its high performance and accessibility to information from distributed databases (Mahmood et al., 2019).

Traditional security mechanisms such as passwords, firewalls, and antivirus protection are no longer sufficient to secure corporate information in scenarios where employees own the devices and have full control over them. One of the biggest ERP security challenges is the risk of data loss or device loss, where sensitive data can fall into the wrong hands (Mahmood et al., 2019). Allowing employees to bring their own devices to work and connect to the organisation's environment can lead to data breaches, which can have severe consequences such as lawsuits, excessive costs, and loss of customer confidence (Bevilacqua et al., 2020; Harris & Patten, 2014).

Of all the risks mentioned above, a company looking to install a new ERP solution may face several risk factors. However, organisations that anticipate potential challenges and develop strategies to address them are more likely to succeed.

2.18 Socio-technical effects of enterprise resource planning implementation in South Africa

The socio-technical environment refers to the interrelationship between the social and technical aspects of an organisation, relevant to the country in which the system is implemented (Mitra & Mishra, 2018). The socio-technical methodology that an organisation plans to adopt should optimise the design process of two sub-systems. To function effectively, the system and its environment must be managed (Pettrey, 2019). Therefore, organisations adopting ERP systems should research their social and technical environment before designing a customised ERP that fits their

environment, as off-the-shelf purchases are not always ideal for organisations worldwide.

The socio-technical impact of ERP system implementation in South Africa may influence the ERP system selection process. Managers must ensure that their ERP implementations match the expected cultural profile of the country. Dayan-Riva et al. (2019) proposed a model to describe an organisation's culture, which can provide insight into an organisation's actual culture and strategic alignment to change. Public sector organisations must be aware of the cultural implications when choosing an ERP implementation to ensure its success.

The implementation of a new ERP system can force organisations to modify their existing applications and redesign critical business processes to accommodate the new system (Le Coze, 2018). However, adopting an off-the-shelf ERP system to avoid the high costs and complexities of implementing a tailor-made system can often lead to a failed adoption.

To achieve sustainable organisational performance, it is important for organisations to understand the interdependence between the social and technical systems (Badewi & Wafaa, 2019). The correlation between social and technical systems is critical for improving sustainable business performance (Dwyer, De Meo-Monteil, Saron & Rivera, 2021).

According to Shah et al. (2011), socio-technical factors play a critical role in the implementation of any technological system in a human social environment, and the success of the system is highly dependent on these factors. Coordination between business units is particularly important in integrating technical and social systems and introducing the desired changes to an organisation. Technical and social factors are both essential for the success or failure of an ERP system (Kwahk & Ahn, 2010). Organisations must continuously adjust their technical and social systems to influence organisational perceptions, employee attitudes and emotions, and enable employees to embrace change (Kwahk & Ahn, 2010).

Whitworth (2009) emphasises that the performance of an information system is better defined by how well it interacts with its environment rather than just its function within the organisation. Non-functional requirements such as security and reliability are part of the system's performance in a successful system. Organisations desire systems that are functional, flexible, scalable, and interconnected while achieving all necessary goals such as security, reliability, privacy, and ease of use.

Continuous innovation and technological development have made the organisational context one of the major research domains for organisational scholars (Fischer & Baskerville, 2020). Therefore, organisations have recognised the importance of achieving a fit between the social and technological environment, which is referred to as the socio-technical approach (Badewi & Wafaa, 2019). The socio-technical approach suggests that human and technological behaviour should be oriented coherently and interactively, and any change in technological behaviour will affect work-related social relationships, feelings, and attitudes as well as the success or failure of the new technological behaviour (Hadidi et al., 2020).

Integrating the social and technological systems of an organisation can lead to better achievement of desired outcomes (Mahmood et al., 2019). This socio-technical integration is crucial for organisations to achieve sustainable performance and introduce new products, services, and business models (Fischer & Baskerville, 2018). The environment in which an ERP implementation takes place encompasses various interrelated organisational issues, such as business processes, management style, culture, policies, work practices, and collaboration among sub-units. An ERP system comprises the organisational routines and policies that constitute a socio-technical system, including a cloud network and tools that an organisation's employees use (Baptista et al., 2020).

African developing countries must consider human resources, technical concerns, and socio-political challenges when adopting an ERP system (Mpanga & Elbanna, 2019). Developing countries face fundamental issues such as career development, limited access to technologically advanced resources, and affordability. Technical development quality, security, data availability, infrastructure such as signal or

network availability, illiteracy, language barriers, political instability, and affordability are common issues (Mutuva & Kisimbii, 2020). Vendors need to understand the contextual setting of developing countries and study how to effectively apply information technologies developed in Western countries, such as Europe and North America, in African countries.

The Fourth Industrial Revolution, also known as 'Industry 4.0', has brought a shift into the global landscape, requiring a connection between resources, services, products, and human beings in real-time through digitalisation and digitisation (Stock et al., 2018). It is vital for an organisation to predict the major impact on sustainability and its transitions due to the shift towards the application of technologies and concepts in this paradigm (Tran et al., 2014).

The adoption of ERP poses a challenge for organisations in South Africa due to the high capital cost and shortage of IT skills (Xin & Levina, 2008). To address these adoption barriers, Software as a Service (SaaS) has emerged as a potential solution. SaaS allows vendors to manage software and deliver it as a service over the Internet (Xin & Levina, 2008). However, in South Africa, the value of cloud computing is not always clear and is hampered by required networking infrastructure, as revealed by the 2009 Fujitsu Technology Solutions survey (Nthoiwa, 2010).

In 2001, the South African government promoted the adoption of Open-Source Software (OSS) through a policy document that encouraged all government departments to fully support its adoption (Tome et al., 2014). However, the political influences and the risks associated with the scale and complexity of large government organisations made it difficult to use OSS, resulting in limited usage within government departments (Tome et al., 2014). This is consistent with the reluctance of governments in economically developing countries to customise IT applications and their tendency to opt for proprietary off-shelf products (Asif, 2021).

Mpanga and Elbanna (2019), Kemboi et al. (2019), and Chipanga (2021) have found that adopting ERP systems designed for the United States and Western Europe can lead to system inconsistencies in organisations in developing countries.

Pursuing a standardised implementation of the system without researching the country's environment can result in significant changes in the processes, structures, roles, and policies of the implementing organisation. This can affect operational efficiency, reduce the organisation's customer service, and even undermine competitiveness (AL-Zoubi & Al-Haija, 2018). Authors such as Wang et al. (2022), Hasheela-Mufeti (2018), and Mutuva and Kisimbii (2020) argue that ERP causes significant cultural transformation in an organisation and tends to reset organisational values in terms of discipline, change, and processes. Samiei and Habibi (2020) emphasised that organisations should not buy off-shelf systems, as ERP systems developed for one set of institutional environments may not fit organisations operating in different institutional environments related to the technological advancement of the country. Vendors often overlook or underemphasise the influence affecting the success or failure of modern technology adoption as influenced by the social environment of that specific country.

From the social environment discussed above, it should be noted that different perspectives in the culture of developing countries in Africa and local vendors of ERP in developing countries need to devise appropriate ways of coping with all the external environment (PESTEL) analyses from which an organisation operates and create a platform for appropriate information systems. The technological outcome is therefore dependent on the internal workings of the technology developers and the values of its members.

2.19 Conceptual framework and hypotheses

In today's highly competitive market, technologically advanced organisations rely heavily on their intellectual capital instead of their physical assets (Beker et al., 2021). Therefore, there is growing recognition that intangible assets and expertise are considered a firm's invisible assets and the sources of competitive advantage have shifted away from tangible assets (Beker et al., 2021). Unfortunately, managing intangible assets can be costly and time-consuming for organisations, with companies such as IBM, HP, and Dell investing heavily in managing their intangible assets (Beker et al., 2021). The mobile nature of today's workforce means that organisations must also consider the age of their physical assets as

technology quickly becomes outdated (Beker et al., 2021). Thus, organisations must manage both types of assets, physical and knowledge assets, for sustainable success (Li et al., 2018).

The main theoretical framework for predicting and interpreting the relationship between variables is the knowledge-based views of an organisation's context. However, previous studies such as those by Al-Mahaseneh and Harb (2022), Günsel et al. (2020), and Lee (2021) do not explicitly recognise the conceptual perspectives on the relationship between KM and ERP. These studies had to emphasise these relationships by looking specifically at the successes and failures thereof.

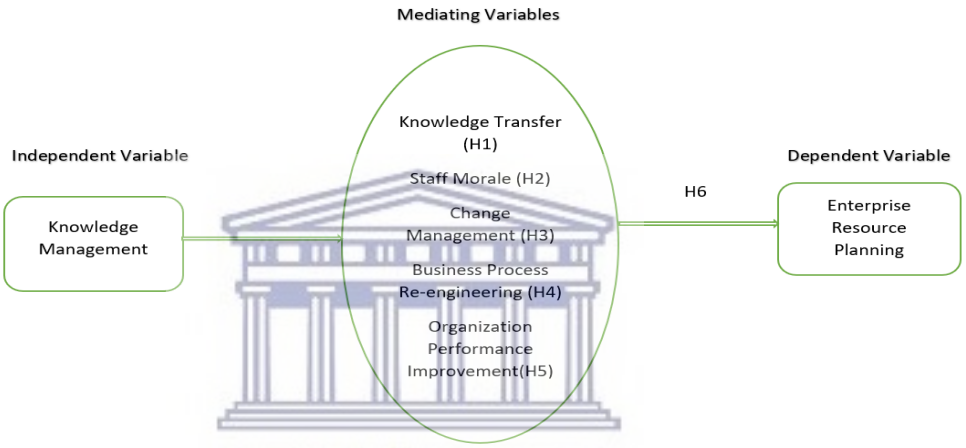


Figure 2.1: Conceptual framework for the public sector ERP implementation

Mediating variables of knowledge management when implementing ERP

a) Knowledge management

Effective use of knowledge management in ERP implementation accelerates the process while producing positive effects on ERP usage for organisations to enhance their implementation. A proposed ERP implementation framework for public sector organisations emphasises the need to comprehend the benefits of complementary processes (Chipanga, 2021).

b) Staff morale

ERP implementation helps improve individual performance and streamline job processes. To achieve organisational goals, employees require a clear direction from managers and the persistence to attain desired objectives. By motivating employees, organisations can attain successful implementation of ERP systems. Top management must create a comfortable and productive work environment where employee views and opinions are listened to (Al-Zoubi & Al-Haija, 2018; Bekele, 2019). Technical and business skills are both necessary for successful ERP implementation (Sumner, 2018).

c) Change management

ERP implementation literature identifies change management as the most critical success factor. Organisations must collaborate with end-users to avoid resistance to ERP implementation during the final stage of implementation (Beydoun et al., 2019; Menon, 2019; Sislian & Jaegler, 2020). It is important to explain the benefits of ERP implementation compared to the traditional system to employees (Menon, 2019). Effective change management is necessary as it can determine the success or failure of ERP implementation, depending on employee acceptance (Albarghouthi et al., 2020; Azima et al., 2019; Setiabudi et al., 2021). Thus, organisations should manage change effectively and inform employees of any changes in advance during ERP implementation. Change management is, therefore, an essential aspect of ERP implementation.

d) Business process re-engineering

According to Epizitone and Olugbara (2019), BPR is a critical factor for the success or failure of ERP projects in any organisation, and should be approached with caution in any business strategy implementation. Implementing an ERP system involves all the important subdivisions of an organisation that participate in the improvement of business process management (Gunjal & Gogte, 2019; Isetta & Sampietro, 2018).

Akram et al. (2019) reported a case of a failed implementation of SAP-R/3, which was due to inappropriate business re-engineering, with the manufacturer's major business processes being the root of that failure. Therefore, it is important for organisations to understand that implementing an ERP system requires the development of new business processes that align with the organisation's goals (Dutta & Kumar, 2021). As an organisation adopts a new system, it is essential to ensure that employees are trained to understand how the system changes the business processes they are used to, to foster acceptance of the change (Al-Shamlan & Al-Mudimigh, 2011). Employees are less likely to resist change if they are properly introduced to the new system and informed of its benefits (Manise, 2018), as well as other vendor software and tools (Shatat and Shatat, 2021). According to Manise (2018), the success of ERP implementation is more dependent on an organisation's business processes and the ERP design.

e) Knowledge transfer

Effective knowledge transfer is essential for the successful implementation of ERP. An organisation needs to share knowledge with vendors and allow end-users to have input in the implementation of the system. By doing this, an organisation can reduce the costs associated with correcting mistakes caused by the lack of information transfer, and improve its clients' service delivery while gaining competitive business advantages through effective product and process innovation (Ghani et al., 2019). Thorough awareness and identification of the knowledge required for any implementation are the core of ERP implementation. ERP implementation should be able to integrate an organisation's information regarding its resources to create interactions with business partners and enhance operational performance to enable an organisation to gain a competitive advantage in the market.

f) Organisational performance

According to Sheik and Sulphey (2020), an organisation's operational strength and productivity improvement are dependent on the perfect alignment of the ERP to the organisation's needs. The software's features and capabilities play a key role in

helping an organisation achieve its optimum goal of customer satisfaction and profit maximisation. Rashid et al. (2019) concluded that an organisation's benefits from the ERP system should include its ability to bring innovative products to its major commercial clients. An organisation's objectives linked to its strategic goal should be consistent with those of the ERP system's strategic goals (Shi & Wang, 2018).

The proposed framework above demonstrates the organisational transactions that can result from the implementation of ERP that is aligned with an organisation's KM. ERP implementation introductions refer to the transfer of business knowledge that is incorporated in the basic architecture of the software package into the adopting organisation. The knowledge exists at various levels in an organisation, and it must be transferred from the individual management level to subordinates, departments, and sub-departments. At the beginning of a project, implementation consultants or the selected vendor possess ERP package-related knowledge, while business users have knowledge related to company business processes and the flow of information into data. Dutta and Kumar (2021) emphasised that effective implementation requires business users to learn ERP package knowledge from consultants and consultants to absorb business process knowledge from business users. This is the transfer of information from one party to the next so that there is an alignment of information to help the new system work better.

Hypotheses of the study

a) H_1: There is a positive significant association between knowledge management and enterprise resource planning through the mediation of knowledge transfer from the perspective of the managers of an organisation.

b) H_2: Constant knowledge sharing by an organisation has a positive significant impact on staff morale, which has a positive impact on ERP implementation.

c) H_3: KM that recognises the importance of change management and organisational culture has a positive impact on ERP implementation success.

d) H_4: The management of an organisation that acknowledges the user needs as defined by BPR is positively correlated to the ERP implementation success.

e) H_5: More extensive use of KM for the aim of organisational performance improvement has a positive significant impact on an enhancement and easier ERP implementation.

f) H_6: A KM that is correctly applied using the mediating variables such as employee morale, organisation improvement, knowledge transfer, business process re-engineering, and change management yields a successful ERP implementation.

The introduction of an ERP system into an organisation can create uncertainty regarding job security among employees, negatively affecting their morale (Agrawal & Mukti, 2020). To avoid reluctance towards ERP among employees, organisations should involve them in each stage of the adoption process, ensuring their satisfaction and preventing low productivity and customer dissatisfaction (Agrawal & Mukti, 2020).

According to Hasan et al. (2019), the lack of ongoing BPR may result in incurred costs for an organisation that take time to rectify. Furthermore, unexpectedly higher costs incurred during system implementation can lead to an unfavourable stakeholder attitude towards the system, ultimately affecting business turnover. Therefore, providing stakeholders with thorough training on system usage is crucial for a successful ERP implementation (Tsogkas et al., 2019). From an employee's perspective, the implementation of a new system can make them feel like they are losing control over their work environment, leading to destabilised morale and decreased enthusiasm for work.

ERP sustainability relies on ongoing staff training, which can provide organisations with significant benefits (Oghazi et al., 2018). To avoid user resistance towards the

system and encourage inter-departmental integration, all sub-departments of an organisation should continuously be trained on ERP usage (Caserio & Trucco, 2018). User attitudes towards system use can significantly affect productivity, job satisfaction, and organisational loyalty.

For successful ERP implementation, people, processes, departments, and the organisation must undergo changes (Loonam et al., 2018). Change management is a crucial factor for a successful ERP implementation, as emphasised by various authors, including Deelert et al. (2022), Abdullahi et al. (2021), and Law (2019). Therefore, organisations need to structure their change management strategies and business process methodology to achieve their goals (Jarrar et al., 2019).

Yun et al. (2018) state that effective communication is a crucial factor when discussing changes and is required throughout the entire business process and on all levels, even if employees are not directly connected with business process management (BPM). Change management involves human resources as well as social changes, which top management needs to introduce new processes and structures to prepare people to accept changes and reduce their reluctance to change.

BPR is a well-known fundamental rethinking and radical redesign of business processes, which enables an organisation to achieve significant improvements in critical contemporary measures of performance such as cost quality, service, and speed (Budiman et al., 2021). Scholars such as Sumner (2018), Barth and Koch (2019), and Mbugua (2021) argue that BPR is a derivative of scientific management and is therefore further enhanced by the value chain concept, hence non-value-adding processes should be eliminated rather than improved or automated (Okumbe, 2018).

For the major manufacturer they studied, BPR proved effective in reducing overlapping activities and reducing handoffs (transfer of paper) in shipping, invoicing, order processing, and other activities (Gichanga, 2019). BPR has the potential to solve problems by linking requirements, consolidating forecasts, identifying production delays, eliminating shipping delays, and reducing the inventory of finished goods. BPR can standardise processes and introduce more

thorough and systematic procedures. Adapting systems department skills to current technology to do a better job for the business can often help reduce expensive IT labour costs, in the same way that ERP reduces costs.

Organisations that implement ERP systems should evaluate whether the system has achieved the intended business outcomes, such as cost reduction or inventory reduction, and improved delivery reliability and speed. Therefore, it is important to measure performance at each stage of the ERP implementation to ensure the organisation's success. This enables continuous improvement at all stages of the implementation when performance regressions are identified. However, most theoretical models, like that of Mubarik et al. (2019), only measure performance at the end or live phase of their ERP project. Sumner (2018) recommends setting performance indicators based on the goals of the ERP implementation to measure the contribution of the ERP system to the business after going live.

A lack of step-by-step performance evaluation makes improvement actions impossible and jeopardises ERP success (Ramdani & Hadijah, 2020). Objectives should be formulated consistently with the organisation's strategic objectives, as information systems such as ERP are used to achieve them (Ramdani & Hadijah, 2020). Therefore, an organisation with a well-crafted ERP goal instrument would appreciate not only the ERP's role in achieving strategic goals but also the impact of the system on other organisational components.

As outlined above, the conceptual framework of this study aims to include the key variables that lead to the effective implementation of ERP systems. Motivated by the theoretical importance of an organisation's implementation of an ERP system, the proposed conceptual framework includes the most important intermediate variables. The main argument is that the success of most ERP systems depends on the initial implementation steps (Goundar et al., 2021; Sumner, 2018), relying heavily on collaboration with external consulting groups. This study develops a conceptual framework for ERP implementation, where KM is an independent variable, ERP is the dependent variable, and mediation variables are change management, business process re-engineering, employee morale, organisational improvement, and knowledge transfer.

2.20 Chapter summary

This chapter provided a comprehensive discussion of the literature related to ERP systems and KM in an ERP context. ERP systems integrate an organisation's processes into one database, as highlighted by Ray et al. (2018). The evolution of ERP systems in the literature, as noted by Monk and Wagner (2012), began with Material Requirements Planning (MRP) in the 1960s and has since evolved to include Manufacturing Resource Planning (MRP II) and eventually ERP. This evolution highlights the need for knowledge expansion and requirements to implement and maintain ERP systems. The literature also explores the benefits and determinants of successful ERP implementation and the risks associated with it. The study aims to contribute new knowledge to the field by addressing knowledge gaps in KM for the ERP context. The chapter concludes by presenting the research design and methodology that will be used in the study.

According to Kurnia et al. (2019), the adoption of an ERP system can benefit an organisation in various areas by integrating its processes. Effective KM is particularly crucial for achieving ERP implementation success, as highlighted by Jayawickrama et al. (2019). The literature also discusses the socio-technical effects of ERP implementation in South Africa, which can affect the off-shelf purchase of the system without considering the environment in which it would be implemented.

The conceptual framework of ERP implementation from the KM perspective is discussed, and hypotheses are developed based on the literature. These hypotheses will be tested using the methodology presented in the next chapter. The study aims to fill knowledge gaps in KM for the ERP context and contribute new knowledge to the field. The next chapter presents research design and methodology.

CHAPTER THREE: RESEACH DESIGN AND METHODOLOGY

3.1 Introduction

The preceding chapter reviewed literature relevant to this study. The main purpose of this chapter is to describe the research design and methodology for the study, as well as to justify the choices made. This chapter aims to establish a systematic and coherent methodology for investigating the relationship between KM and ERP implementation in the public sector. It outlines the research philosophy, approach, design, strategy, and methods selected for this study, along with the justifications for their selection. Additionally, it explains the qualitative and quantitative data collection methods used and the reasons why they were chosen over other available research methods. The chapter also describes the data analysis methods used.

3.2 Methodology explained

This section discusses research methodology as a technique used to classify, select, approach, and analyse information related to a research topic. Its purpose is to enable the reader to critically assess the overall validity and reliability of the study. According to Gurumurthy and Lloyd (2019), research methodology is the main principle that guides research and specifies the appropriate research method to use. They further explain that research methods are different from research methodology because research methods are the tools used to collect data.

Johnson et al. (2019) suggest that methodology addresses how we reason based on causality, and it is done by examining which terms guide model building and model testing, model building and empirical evaluation, depending on the research question and research hypothesis. Yin (2009) views methodology as a map, and it is a series of steps to move between two locations on the map. This study uses a model to conduct research in the context of a methodology referencing paradigm that encompasses underlying beliefs that guide researchers in their choice of research method (Osuagwu, 2020).

According to Osuagwu (2020), methodology is closer to research practice and is the philosophy for paradigms. Its empirical significance emphasises the independence of theoretical research methods from methodologies and paradigms. The study design is important in any study to associate the methodology with the right set of research methods to answer the research questions and hypotheses raised to study social phenomena (Neubert & Van Der Krogt, 2019). Despite the importance of methodology, there is no academic consensus on definitions and methods in this field. Scholars such as Wilson (2002) and Tuohy et al. (2022) argue that the difficulty of social science methods is human subjectivity and the associated difficulties in understanding that subjectivity.

The focus of this study is on the relationship between KM and ERP in the public sector. As research methodology comprises a set of specific techniques and tools for collecting and analysing data, the goal of this study is to develop a conceptual framework that public sector organisations can use to implement ERP in a targeted, efficient, and sustainable manner. To achieve this, it is essential to analyse the importance of existing knowledge management and ERP implementations as a background for the current research.

To create a robust study design, this study follows the research onion framework (Figure 3.1) proposed by Saunders et al. (2019). The research onion framework visually describes various aspects of research that need to be considered and planned. By following this framework, the researcher is guided through all the necessary steps required to develop a research methodology.

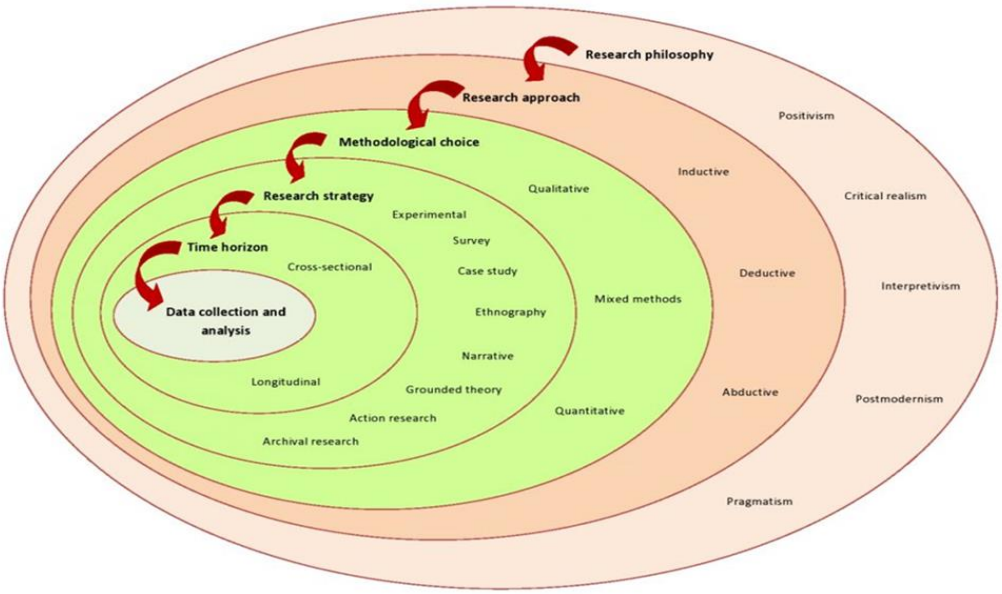


Figure 3.1: The 'research onion'

Source: Saunders et al. (2019)

3.3 The philosophical stance of the study design

Saunders et al. (2019) provide a definition of research philosophy as a means of knowledge development and its specific properties in particular fields. Research philosophy pertains to how researchers perceive the world and their beliefs regarding what constitutes acceptable knowledge for research. Such assumptions are significant to a researcher's perception of the world, learning in general, and their contribution to the curriculum. According to Kaushik and Walsh (2019), these assumptions help select suitable research strategies and designs. It may not be necessary to examine the philosophical underpinnings of research, but it is important to consider philosophical choices and to guard against alternative choices that might have been made (Saunders et al., 2019).

The study of human society has necessitated social science to diverge from natural science and focus on the nature of being and epistemology. As such, it is important to consider ontology when conducting social studies (Hürlimann, 2019; Lawani,

2020; Mohajan, 2018; Vincenti, 2020). Ontology and epistemology have been the subject of intense debate among academics in recent years, but there is no universally agreed account of ontology and epistemology. Positivism and interpretivism are the two major camps in social science research, with positivists viewing reality as independent of the researcher, while interpretivists regard reality as subjective and socially constructed (Iyamu, 2021; Kirongo & Odoyo, 2020; Ragab & Arisha, 2018; Yin, 2009).

Research philosophy refers to a set of ideals and assumptions related to the development of knowledge, and a legitimate research philosophy is composed of a consistent and well-thought-out set of assumptions that underlie the research process, data collection methods, research questions, and methodological preferences of the researcher for the specific study (Gurumurthy et al., 2018). A researcher's methodological preference is based primarily on the paradigm, which encompasses fundamental theoretical ideals with shared assumptions and methodological strategies that shape the research process (Iofrida et al., 2018). Paradigm refers to the set of essential theoretical ideals, assumptions, and methodological strategies that are shared by researchers within a particular field (Maarouf, 2019).

This study has employed a mixed method research approach to investigate the four philosophies: positivism, post-positivism, interpretivism, and pragmatism. The mixed-method approach is suitable for this study as it provides a comprehensive understanding of the research topic by integrating both quantitative and qualitative methods (Creswell & Plano Clark, 2018).

Positivism is concerned with uncovering truth and presenting it through empirical means (Hassan & Mingers, 2018). Positivists assert that scientific knowledge consists of facts and view reality as independent of social construction. While positivists focus on experimental and quantitative methods, they also have an interest in using qualitative methods to gather broader information outside readily measured variables (Bonache & Festing, 2020).

Post-positivists, on the other hand, reject the idea that any individual can see the world perfectly as it is. Post-positivists view reality as being subjective and move away from the purely objective stance adopted by logical positivists (Ryan, 2019). Post-positivism contests the scientific theories of reality by disputing the elemental tenets of positivism (Kankam, 2019).

Interpretivism is based on the belief that meaning and context are essential for every research issue, as the real essence of reality cannot be known (Firouzi et al., 2018). Interpretivism highlights that social reality may be viewed and interpreted by individual beliefs with the ideological positions that they hold. Interpretive researchers assume that access to reality goes through social constructions such as language, realisation, shared meanings, and instruments (Myers, 2011). Interpretivism is very observant of what people say, do, and feel, and the way they create meaning for the phenomena being researched, using meaning (versus measurement) oriented methodologies such as interviewing or participant observation as their main character.

Finally, pragmatism is concerned with practical approaches to knowledge, focusing on the practical application of ideas rather than their abstract conceptualisation (Kelly & Cordeiro, 2020). Pragmatists believe that knowledge is constantly evolving and that knowledge claims should be tested in practice. The aim is to identify what works in practice rather than what is objectively true.

The use of a mixed method approach enables the research to triangulate data by cross-verifying the findings from different sources, methods, and perspectives (Creswell & Plano Clark, 2018). This approach allows the study to gain a deeper understanding of the research topic and provides a more comprehensive analysis of the research findings.

Then finally there is the pragmatism theory. The pragmatism theory, as described by Morgan and Hoffman (2019), posits that truth is not necessarily what one would expect from a philosophically interesting theory. Pragmatist scholars such as Creswell and Hirose (2019), Denzin (2012), Halcomb and Hickman (2015), and Goldkuhl (2012) contend that there is an objective reality outside of human

experience and that philosophical debates, especially metaphysical debates, should not be neglected. These researchers maintain that the broader philosophical debate can never be resolved, as its meaning is closely related to human experiences and needs, and highly contextual (Kaushik & Walsh, 2019).

A key principle of pragmatist philosophy is that knowledge and reality are socially constructed and reinforced beliefs and practices (Kaushik & Walsh, 2019). Pragmatists acknowledge that everyone's knowledge of the world is socially constructed, but some versions of these social constructions are more consistent with individual experience than others (Kaushik & Walsh, 2019). Pragmatists believe that individuals are free to believe what they want, even though certain beliefs are more likely to meet their goals and needs than others (Kaushik & Walsh, 2019).

The method and design of this study are underpinned by the paradigm of pragmatism, which combines the positions of both positivist and interpretive perspectives. The researcher utilised all philosophical aspects of this study to combine these two widely opposed positions: positivism, which holds that reality is independent, and interpretivism, which asserts that reality is socially constructed. The primary aim of this study was to understand the reality of participants' views and their ontological stances regarding the implementation of ERP in public sector organisations and the use of knowledge management as a key tool in this implementation. This philosophical choice focuses on public sector organisations that have adopted ERP systems, while helping researchers to utilise mixed methods and deliver acceptable new knowledge according to research questions and hypotheses.

3.4 Research approach

This study discusses the three main approaches to research: deductive, inductive, and abductive. Deductive research begins with a theoretical framework, followed by method, data collection, analysis, and findings, whereas inductive research starts with the collection and analysis of data, followed by the development of a theoretical framework based on the findings (Basias & Pollalis, 2018). According

to Ragab and Arisha (2018), the researcher may deduce a new theory for the study by analysing and synthesising existing ideas and concepts in the literature. This approach focuses on deducing ideas and facts from a new theory to develop a more coherent framework than previous theories. Basias and Pollalis (2018) argue that the logical deduction and operationalisation process, as well as the testing of the study theory against empirical data, are crucial components of this approach. Bashir et al. (2020) note that the deductive approach is dominant in natural sciences, as it allows researchers to predict and control phenomena.

When using a deductive approach, a theoretical foundation with alternative hypotheses can be developed. The study's introduction should justify the theory before deducing hypotheses. These theories are not grounded in empirical observation but are based on proposed theories that may not yet be fully validated, and they are open to criticism by reviewers who may suggest alternative theories and hypotheses for the research (Woo, 2019).

The inductive approach, however, begins with observations, and study theories are proposed at the end of the research process resulting from the observations (Bernard, 2017). In inductive studies, the researcher is not expected to apply any theories or hypotheses at the beginning of the research, and they may alter the direction of the study after the research process has already commenced. The researcher should not disregard theories when formulating research questions and objectives (Bougie & Sekaran, 2019). This approach focuses on generating meanings from the collected data set, identifying patterns and relationships, and building a theory (Bougie & Sekaran, 2019). An inductive approach allows the researcher to use an existing theory to formulate the research question to be explored (Saunders et al., 2019).

The abductive approach addresses weaknesses associated with both deductive and inductive approaches. It follows a pragmatist perspective, taking unsure observations from experience and reality, which may then lead to the best prediction of the truth or a new theory (Mitchell & Education, 2018). The abductive approach is well-suited for making logical inferences and constructing theories, as with the deductive and inductive approaches. The research process starts with bits and pieces

of information and then ends with a fuller picture. The abductive approach explores potential explanatory patterns within the facts of a phenomenon that would help the researcher reveal a path from facts to ideas and theory (Yin, 2009). It may change the initial theoretical framework, the researcher's developed framework or adopted framework, and the research process (Rashid et al., 2019).

This study adopted the abductive approach as it is a combination of deductive and inductive approaches that move back and forth (Saunders et al., 2019). Abductive research works in between inductive and open-ended research methods and research questions to hypothetical and deductive attempts to verify hypotheses, which are the data collections that this uses (Rashid et al., 2019). The abductive approach helped in fulfilling all the objectives of the study, which aim to answer the above study questions whose **objectives** are:

a) To determine the role that knowledge management and knowledge transfer play in supporting the implementation of ERP systems in an organisation.

b) To ensure that organisations are aware of and maintain positive staff morale during the ERP system implementation and prevent reluctance to change.

c) To prepare organisations for change management adjustments on their operations post-ERP implementation.

d) To address the influence that the KM has on business process re-engineering during the ERP system implementation.

This approach also helped in verifying the **hypothesis** of the study that originates from the mediating factors that help the implementation of ERP from the KM. The hypothesis of the study are as follows:

a) H_1: There is a positive significant association between knowledge management and enterprise resource planning through the mediation of knowledge transfer from the perspective of the managers of an organisation.

b) H_2: Constant knowledge sharing by an organisation has a positive significant impact on staff morale, which has a positive impact on ERP implementation.

c) H_3: KM that recognises the importance of change management and organisational culture has a positive impact on ERP implementation success.

d) H_4: The management of an organisation that acknowledges the user needs as defined by BPR is positively correlated to the ERP implementation success.

e) H_5: More extensive use of KM for the aim of organisational performance improvement has a positive significant impact on an enhancement and easier ERP implementation.

f) H_6: A KM that is correctly applied using the mediating variables such as employee morale, organisation improvement, knowledge transfer, business process re-engineering, and change management yields a successful ERP implementation.

The abductive approach adopted in this study is well-suited to the positivist research philosophy, as it combines both deductive and inductive approaches and allows for exploration of past studies from different perspectives (Epizitone & Olugbara, 2020; Le Roux, 2020).

3.5 Methodological choice

Because of the absence of well-validated tools to identify variables associated with the phenomenon and track samples, the present study could not be guided solely by quantitative or qualitative methods. While qualitative research is suitable for exploring an individual's experience in-depth, it does not provide reliable evidence of KM utilisation efficiency in ERP implementations. Qualitative research provides a limited sample size and is restricted in terms of generalisation, making the quantitative aspects of the study crucial for understanding ERP implementations in public sector organisations. Therefore, a mixed method research design is necessary to strengthen the context and impact of the study. Mulhern et al. (2019) argue that

integrating quantitative and qualitative data provides a comprehensive understanding of research questions. Mixed method research involves a paradigm that guides action and characterises the worldview of adherents concerning ontology, epistemology, and methodology to drive the process of inquiry (Cseh & Jeffries, 2019). Simply addressing open-ended questions at the end of a quantitative survey and qualitatively conducting interviews does not constitute a mixed method approach.

The mixed methods approach was deemed most suitable for this study because it provides both an overview and a deeper insight into the research question (Binnie et al., 2021). Berrell (2021) argued that knowledge management is a dual paradigm and that the research aims to address both humanitarian and technical aspects, which requires both quantitative and qualitative data to address the study's issues. These research methods complement each other, allowing a more profound understanding of the phenomenon (Fetters & Molina-Azorin, 2021).

The mixed methods approach enables the use of both inductive and deductive reasoning, with qualitative results informing subsequent quantitative elements. Johnson et al. (2019) demonstrated concurrent qualitative and quantitative research that complements mixed-methods research, and pragmatism provides an attractive philosophical partner for mixed-methods research. This study uses a simultaneous parallel sampling design, which involves parallel designs in which the samples for qualitative and quantitative elements are different but drawn from the same population of interest (Onwuegbuzie & Leech, 2019). As mentioned in the philosophy above, the deductive logic of the quantitative element allows the use of theories derived from qualitative data to develop and evaluate hypotheses. Thus, the researcher's choice to use mixed methods helped deduce the strengths of both research methods, using each to understand various aspects of the same phenomenon (Stoecker & Avila, 2021). The quantitative methods also helped in evaluating innovative ideas for implementing ERP in public sector organisations. This approach allowed the researcher to express the benefits of the study in the following ways:

a) Triangulation

The triangulation design is crucial in ensuring the validity and reliability of a study through seeking corroboration between quantitative and qualitative data and their results. Concurrent triangulation involves interpreting collected data by discussing the extent to which the data converge, ensuring that the conclusions of the study are accurate and truthful, and related to the study's conceptual framework (Thomas, 2021). The use of triangulation designs provides evidence of reliability and validity when the conclusions from one study can be extrapolated to other studies, regardless of population, setting, or time (Baharmand et al., 2022). Hence, the study design is deemed the most critical aspect of the research process to ensure the best opportunity to answer the research questions (Baharmand et al., 2022).

Triangulation designs are useful in confirming, cross-validating, and corroborating study findings (Buchanan & Gardner, 2019). Triangulation allows for a broader perspective on the topic and the study of distinct groups or levels within a single study. Through triangulation research, agreement and validation of results can be achieved through various research methods (Adakawa & Garba, 2020).

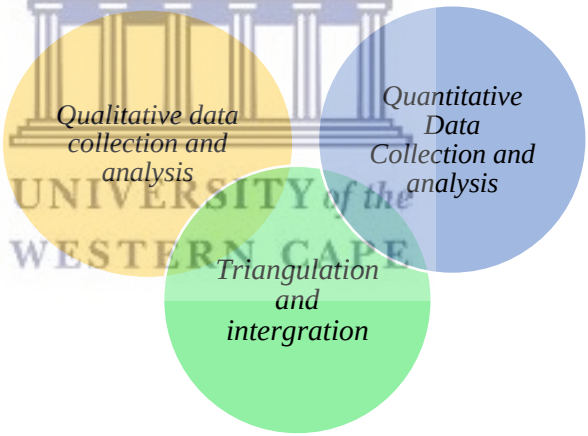


Figure 3.2: Concurrent triangulation method illustration

b) Completeness

Combining multiple research approaches can provide a more complete and comprehensive understanding of research phenomena. The triangulation method enables researchers to gain a global perspective of the phenomenon being studied (Yin, 2009). Adami and Kiger (2005) emphasise the importance of providing a clear

explanation and justification for using triangulation in research studies due to the various meanings and uses of the term.

In this study, the qualitative research paradigm produced a rich dataset, which enabled the researchers to formulate hypotheses for quantitative investigation (Theodory, 2021). Qualitative paradigms are employed to generate in-depth data and a comprehensive understanding of the phenomenon under investigation. Quantitative research methods are then applied to collect and analyse data to obtain a deeper and more complete picture of the phenomenon.

c) Offsetting weaknesses and providing stronger inferences

Studies by Dawadi et al. (2021), Christofi et al. (2021), and Taylor and Raykov (2020) demonstrate that using a mixed-methods approach can neutralise the limitations of each approach while retaining their strengths. By combining qualitative and quantitative methods, researchers can obtain stronger and more accurate conclusions. Triangulation is an effective way to offset weaknesses and provide stronger conclusions, as each research approach has its own strengths and weaknesses. Combining both approaches can eliminate the weaknesses and enhance the strengths of each.

Throughout the data collection, sampling, and analysis phases, the researcher integrates the qualitative and quantitative elements of this study to strengthen the conclusions. This is a distinguishing feature of this study.

d) Explanation of findings

Mixed methods research enables researchers to use one research approach, whether quantitative or qualitative, to explain data generated from studies using other research approaches. This approach provides unexpected insights and flexibility, increasing the credibility, persuasiveness, and quality of research results (Dzwigol, 2020; Farquhar, Michels & Robson, (2020); Summers & Müller, 2020). Pursuing multiple research approaches can provide a wealth of information from multiple perspectives on the same topic, leading to a deeper and multifaceted understanding

of the phenomenon in question (Farquhar et al., 2020; Summers & Müller, 2020; Widder et al., 2019).

e) Illustration of data

The qualitative research approach was used to illustrate quantitative findings to paint a better picture and understanding of the phenomenon under investigation. This sequential design requires the researcher to work on an initial quantitative instrument phase, followed by a qualitative phase to further explore the quantitative results (Farquhar et al., 2020; Theodory, 2021). This study was unique as data collection was done concurrently, allowing for a more integrated approach to the analysis. Both qualitative and quantitative results build on each other, providing a more complete picture of the phenomenon under investigation (Theodory, 2021). In this study, survey data was explored further with interviews to better understand how the subjective experiences of individuals match the instrument results. Using mixed methods in this way makes it easier to explain qualitatively how the quantitative mechanisms might work.

f) Hypothesis development and testing

The mixed methods approach in this study involved using the qualitative phase to develop hypotheses for subsequent testing through a complementary quantitative phase. By triangulating data from both approaches, the study aimed to provide more comprehensive and valid results through the comparison of convergent, complementary, and divergent findings (Morgan & Hoffman, 2019). A conceptual framework was developed to compare quantitative test results with qualitative themes derived from the variables. Rather than attempting to create a hybrid form of results, the researcher coded the qualitative results to match the quantitative results in the most common ways of expression for each approach.

g) Instrument development and testing

The qualitative approach was employed to generate items for a questionnaire in the quantitative phase of the study. This approach maximised the benefits of using mixed methods to answer research questions by concurrently collecting and

analysing both qualitative and quantitative data and using the findings to develop a rating scale that is adapted to the sample under study (Morgan & Hoffman, 2019). The use of mixed methods research also strengthens the validity and reliability of the study, making it more attractive to research funding (Morgan & Hoffman, 2019). However, Noble and Heale (2019) argue that mixing methods within a paradigm can be problematic, particularly in the case of qualitative research, as each method within the qualitative paradigm brings its own theoretical assumptions to the research study. As such, the researcher must define triangulation from a qualitative research perspective within each paradigm.

Overall, this study demonstrates the benefits of using mixed methods in research, including completeness, offsetting weaknesses and providing stronger inferences, explanation of findings, and hypothesis and instrument development and testing. By using both qualitative and quantitative approaches, the study is better able to provide a comprehensive and accurate understanding of the phenomenon under investigation.

3.6 Research strategy

The literature on research methodology identifies experiments, surveys, case studies, grounded theory, and ethnography, and action research as major research strategies for studies employing deductive, inductive, or abductive approaches (Oliva, 2019; Sileyew, 2019; Thomas, 2021). Experiments are used to evaluate whether there is a causal relationship between variables under investigation in controlled environments with samples from the population (Abdalla et al., 2018). Surveys are preferred for a larger sample and use economic data collection methods, while interviews are suitable for smaller samples (Thomas, 2021).

The study under consideration employed multiple sources of evidence to empirically investigate a contemporary phenomenon. Case studies are a research approach that allows the researcher to answer ‘what,’ ‘why,’ and ‘how’ questions

(Pasque, 2022). Various methods, such as questionnaires, interviews, observations, and documentary evidence, can be used to collect data in case study research.

The mixed methods approach used in this study allowed the integration of different perspectives in knowledge management and enterprise resource planning implementation in the public sector by merging different research strategies to investigate various aspects of the phenomenon (Taherdoost, 2022).

3.6.1 Triangulation protocol

The study employed semi-structured interviews with senior managers of the organisation to explore the real-world implementation of the ERP and to gather their opinions on the matter. Surveys were also used to measure the satisfaction level of junior staff members with the ERP implementation. Data collection for both components was done concurrently and analysed to obtain two sets of results. The researcher combined the results from both instruments to validate and confirm their reliability and examine the issue using different methods to arrive at a more comprehensive picture (Moon, 2019). To triangulate the data, the researcher listed the results of all study components and examined where the results of each method converged, were complementary, or contradicted one another (Noble & Heale, 2019). This exploration of the inter-method discrepancy of the study led to a better understanding of the research questions (Renz et al., 2018). Both data collection procedures were treated equally and combined for complementarity.

3.6.2 Elimination of bias

In every study, the researcher's worldview can be a potential issue, whether from the researcher's or participant's perspective (Olteanu et al., 2019). Olteanu et al. (2019) emphasised that the creation and implementation of an interview protocol are important to reduce bias, especially in this study, as the researcher is also a member of the population pool under study. It is understandable that misunderstandings may arise between participants and researchers during the study; the researcher should avoid such misunderstandings by being unbiased and allowing participants to express their thoughts and feelings (Kross & Giust, 2019).

Cultural differences in communication are one of the factors that make the use of an interview protocol important (Kross & Giust, 2019). The researcher mitigated bias by selecting study participants from different provinces with diverse cultures. This was demonstrated by using an interview protocol, member verification, data saturation, and other strategies to reduce the use of a personal lens during the study's data collection process.

3.7 Population and sampling

According to Majid (2018), a research population is a group of individuals who share common characteristics, behaviours, norms, values, and traits that provide the necessary information for research. The study population is the total number of individuals from which data is collected and serves as the basis for analysing the study's results (Bujang et al., 2018; Poláková et al., 2019). Sampling is the process of selecting enough members from a population so that generalisations can be made about the characteristics or traits of the study population (Berndt, 2020).

There are two types of sampling techniques used to answer study questions and hypotheses: probability and non-probability sampling. Non-probability sampling offers a range of techniques that allow researchers to select samples based on subjective judgement (Weeks, 2020). Probability methods are based on statistical probability theory, along with positivist and quantitative paradigms (Berndt, 2020). Probability sampling techniques aim to derive a representative sample from a population, enabling objectivity while generalising the results of the entire population, whereas non-probability sampling techniques rely on subjective judgements and solid choices (Berndt, 2020).

For qualitative research, samples were selected from a specific group of participants, in this case, senior managers of an organisation, to obtain detailed information to help answer research questions (Tuckett, 2004). Random sampling was unsuitable for qualitative research because the goal was to gain a deeper understanding of the problem at hand (Oates et al., 2017). In contrast, non-probabilistic sampling was a practical technique in the exploratory research phase. The study sample provided researchers with information-rich studies that enabled

them to explore research questions and gain theoretical insights into the study (Nguyen et al., 2021; Poth et al., 2022).

The population of this study comprised employees of the NYDA who had been employed for at least three years at the time of the ERP implementation. The senior management level officials were categorised for the qualitative study and the junior employees for the quantitative study, based on their relevance to the topic and research objectives. In determining the population, the study considered common observable characteristics of the population, such as their role in the ERP implementation and the position they occupy, which Gillis and Edwards (2019) categorise as "population parameters" because of their shared and unique characteristics.

Unlike probability sampling, there are no clear rules regarding the issue of sample size for non-probability sampling techniques. Thus, the study used a logical relationship between the sample selection technique and the research purpose and objectives to determine the sample size that enabled the researcher to maintain the data's credibility. Braun and Clarke, (2021) suggests that it is acceptable for researchers to reach data saturation after interviewing twelve (12) participants. For the qualitative study, the study employed the purposive sampling technique over other techniques available within the non-probability sampling method. Purposive sampling involves the researcher selecting cases that provide the most informative insights into the research questions and objectives (Saunders et al., 2018).

Yin (2015) further notes that for research aimed at understanding commonalities within a homogenous group, 12 in-depth interviews should suffice. Saunders et al. (2018) suggest that it is well-accepted to continue collecting qualitative data by conducting additional interviews until data saturation is reached. In this study, the researcher conducted 14 semi-structured one-on-one interviews and concluded that data saturation was reached after 12 interviews. However, questioning continued until the adequacy of the information obtained was verified.

Interviews are widely used in social science research for collecting information from participants (Mkhize, 2021; Oliffe et al., 2021). The interview process

involves an exchange of verbal communication where the interviewer seeks to elicit information, beliefs, or opinions from the participant (De Villiers et al., 2021). In this study, the qualitative population was 32, and a sample of 14 participants was reached to achieve saturation.

Legard et al. (2003) cautioned that note-taking during an open, semi-structured interview process may distract participants and disrupt the natural flow of the interview. Additionally, the researcher's influence may guide the participant's responses, leading to bias in the study (Rutakumwa et al., 2020). Despite these challenges, interviews are still considered a valuable tool for collecting research data in certain situations.

Suitable interviewees were contacted via official email, and the study's purpose, research questions, goals, and the interview process were explained to obtain informed consent from the participants. All interviews were conducted virtually on Microsoft Teams due to COVID-19 protocols. Before the interview, each participant was required to sign an informed consent form that explained the study's details and purpose. By signing the form, each participant acknowledged that parts of the study and interview excerpts could be used in any research documents resulting from the study. Additionally, each interviewee was offered the chance to review the interview grid sent with the invitation. All interviews were recorded with the participants' consent and were transcribed verbatim. Each interviewee was an expert with direct involvement in the ERP implementation and had been employed for more than three years, indicating their experience with the ERP.

The quantitative component of this study involved using a probability sampling technique, whereby the sample was selected in a simple random manner from the junior staff members of an organisation. Email invitations were sent to participants of the survey, and a reminder invitation was sent again three weeks later to gather more responses. Because the study adopted a mixed-methods approach, qualitative and quantitative data were collected, which allowed for triangulation, complementarity, and the development of new models based on the qualitative data collection to find points of convergence, confirmation, and cross-checking of the

results based on the quantitative data to determine analysis. This approach helped to explain, improve, illustrate, and further clarify the results.

Several factors can affect the sample size decision, including resource availability, accuracy, time, and categories for analysis (Dillman, 2020; Hendra & Hill, 2019). Therefore, the decision for the sample size in this study was based on these factors and the fact that the survey was only aimed at an organisation's junior staff. It is noteworthy that the survey was conducted during the COVID-19 shutdown, which adversely affected staff morale and response rates. Out of 198 surveys sent, 115 responded.

3.8 Time horizon

This study adopts a cross-sectional time horizon as a research strategy to address the research objectives outlined in chapter one. This approach has been employed in prior social science studies (O'Laughlin et al., 2018) and specifically in research on the interplay between KM and ERP (Acar et al., 2017; Agrawal & Mukti, 2020; Khadrouf et al., 2018). The use of this strategy is recommended to reconcile the contradictory findings that have emerged from different approaches to exploring the KM-ERP interplay (Khadrouf et al., 2018). Both survey and interview instruments were used to investigate the impact of KM on ERP implementation and to underscore this inconclusive evidence.

The systemic research approach was chosen to minimise research biases, contribute to theory, and enhance the generalizability of the findings (Chen et al., 2021; Lillis et al., 2017). The cross-sectional strategy differs from common approaches used in prior studies, as noted in the study. Lillis et al. (2017) was drawn upon to argue for the use of cross-sectional case studies to resolve some of the outstanding contradictions in the existing literature about KM's effects on ERP implementation. This was done to clarify the role of all the mediating variables as explained in the study's conceptual framework, where there is contradictory or inconclusive knowledge and to identify organisational fields among which these dimensions differ.

A significant advantage of cross-sectional studies is that they can be performed quickly and inexpensively (Badewi et al., 2018). They are most suitable for determining the prevalence of collected data and can explore associations between multiple exposures and outcomes. Therefore, ethical issues rarely arise in conducting cross-sectional studies. While using questionnaires to reach a large sample of a population of interest is inexpensive, response rates can be low, and it is more costly and time-consuming than using questionnaires that limit sample size. For interviews, higher response and lead rates provide scholars with a significant advantage (Wimmer & Dorjee, 2020). However, their disadvantage is their inability to estimate the incidence and make causal interpretations.

Cross-sectional studies are susceptible to sampling bias since they often require a sample selection of subjects from large and heterogeneous study populations (Wang et al., 2020). This approach was suitable for this study because all variables were collected for everyone at specific time points, the researcher's interest was in relationships, and the data were collected over a brief period of fewer than 12 months.

3.9 Pilot study

A pilot study is a small-scale study conducted before the actual large-scale study to test various aspects of the planned method on a smaller sample (Lowe, 2019). The aim of pilot studies is to avoid the mistake of starting a large-scale study without sufficient knowledge of the proposed method. To prevent fatal errors in time-consuming and expensive studies, pilot studies should be conducted (Malmqvist et al., 2019). This is a data-collecting phase aimed at testing the application readiness of research instrument designs (Malmqvist et al., 2019). Babbie and Mouton (2009) emphasise the importance of testing survey tools before actual surveys due to the following benefits: a) identifying significant shortcomings in the intended purpose of the research tool, b) identifying ambiguities and biases in questionnaires, and c) anticipating participant reactions that may adversely affect the study.

Four participants from the quantitative study and two participants from the qualitative study were used to pilot this study. These participants did not participate

in the actual study but were engaged as part of the field testing of data collection tools.

3.10 Data collection and analysis

The data collection and analysis for this study are discussed in this section.

3.10.1 Qualitative data collection

In collecting qualitative data from the senior management personnel of an organisation, semi-structured interviews were employed as one of the instruments. Alam (2021) indicated that semi-structured interviews are the most commonly used type of interview in qualitative research. Unlike structured interviews, semi-structured interviews allow for flexibility as they do not rigidly adhere to predefined questions. Mahat-Shamir et al. (2021) assert that semi-structured in-depth interviews are the primary source of information for qualitative researchers.

Individual semi-structured interviews were scheduled using Microsoft Teams, with invitations extended in advance, and participants joined as "Guests" to protect their confidentiality and comply with the Protection of Personal Information (POPI) Act. Open-ended questions were asked to focus on the participant's responses to the study's areas, and qualitative audio and visual materials were used for data collection by recording each interview with the interviewees' consent. No qualitative documents were collected during this stage to maintain confidentiality, but notes were taken for further data clarification.

Once the interviews reached saturation, and the responses were found to be similar, a classification schema was created, and no further interviews were conducted. The analysis of the field notes and transcription of the recordings generated a classified database of responses for data analysis, enabling the researcher to develop themes from the responses. Raw field notes, transcribed recordings, and digital recording files were kept on an external electronic memory device with encrypted security to protect the data's confidentiality and security, and the respondents' names were not disclosed.

The semi-structured interview method was deemed appropriate for this study over alternative data collection methods such as observations, focus-group discussions, and the Delphi technique because of its advantages, including flexibility, suitability for collecting in-depth and detailed information, and the ability to explore participants' perspectives and experiences. The advantages are as follows:

a) Semi-structured interviews confirmed existing knowledge and revealed new themes by enabling participants to freely express their views (Zamen et al., 2019).
b) One-to-one semi-structured interviews were more appropriate than focus groups in this study because participants may not have been willing to share personal project experiences in front of superiors, peers, and subordinates (Hammer & Wildavsky, 2018).
c) Semi-structured interviews allowed the researcher to gain an in-depth understanding of individual ERP implementation experiences within the organisation (Chou, 2018; Knott et al., 2022).
d) Interviewees were able to ask the interviewer questions to clarify certain points or provide innovative ideas, thereby encouraging two-way open communication (Belotto, 2018).
e) Interviewers asked leading questions to obtain answers about how different types of knowledge were created, transferred, retained, and applied during ERP implementation (Dommett et al., 2021).
f) Semi-structured interviews provided flexibility in adjusting the direction of questions, which allowed participants to reveal more about themselves and their emotions related to the subject matter, enriching the qualitative data (Evans & Lewis, 2018).
g) The interviewer effectively explored interviewees' thoughts, feelings, and opinions, and followed up on their responses to understand the underlying ideas in a way that other methods could not achieve.

According to Saarijärvi & Bratt (2021), interviewing is a subjective process that enables interviewees to share their opinions and experiences with the interviewer, leading to greater accuracy of the collected data through personal interaction.

Interviews can be audio or video recorded, which facilitates transcription, coding, and data analysis (Brent & Kraska, 2021). However, interviews are time-consuming, particularly if they are fully transcribed, and arranging interview schedules can be challenging. Time constraints can also negatively impact the openness of the interviewee, potentially compromising the trustworthiness of the responses and jeopardising the study's outcomes (Brent & Kraska, 2021).

Despite these challenges, the primary advantage of using interviews in this study was the ability to probe responses and observations as needed to obtain detailed descriptions and explanations of experiences, behaviours, and beliefs. This helped to answer the 'why' and 'how' questions at the core of the study. Through qualitative inquiry, the researcher could ask follow-up probing questions such as "Why do you think so?" or "What did you [not] like?" to elicit greater detail about the interviewees' perceptions of ERP implementation. This approach yielded a rich, in-depth narrative that informed the overall study objective.

Qualitative questioning provides flexibility for the interviewer to ask questions in different ways to ensure the participant's understanding. Open-ended questioning is particularly useful for studying the development of communication plans and messaging strategies.

The main goal of this study was to gain a deeper understanding of the employees' real-world experiences with ERP implementation and provide evidence-based recommendations to the public sector organisation. Semi-structured interviews were used, and an interview guide was developed in advance, which consisted of a list of topics that the interviewer covered during the interview.

Participants were encouraged to provide answers in their own words and to bring up important points. Therefore, each interview flowed differently based on the information shared by the participant. The opening question was the same across all interviews, but the direction of the interview depended on the participant's responses. The interviewer asked follow-up questions, listened to the respondents, and observed cues to determine when to continue or move on, or to let the participant speak without interruption.

During these interviews, certain linguistic patterns, expressions, metaphors, idioms, and proverbs emerged as the participants used them to express their experiences. According to Xaba and Mutambara (2022), this adds a more nuanced understanding of the lived phenomenon in the participants' own words during interviews.

3.10.2 Ethical considerations of data collection

Informed consent and issues of privacy and confidentiality are fundamental ethical considerations in research (Samuel & Buchanan, 2020).

a) *Informed consent*: Before the interview, the researcher explained the risks and benefits to the respondent, enabling them to make an informed decision on whether to participate. They were also provided with a guide outlining the research topic and the types of questions that may be asked, as well as information on how their data would be stored and used (Breuer, Al Baghal, Sloan, Bishop, Kondyli, & Linardis, (2021) While interviews were used for data collection to minimise the risk of harm, sensitive questions had the potential to cause mental or psychological harm, and participants had the right to decline participation. Furthermore, it is worth noting that authenticating participant identities online can sometimes be problematic (Netshakhuma, 2019); therefore, an alias was used to protect their privacy.

b) Privacy and confidentiality: Personal information was kept anonymous by assigning an alias, following the POPI Act No. 4 of 2013, to ensure participants' privacy and confidentiality (Christopher & De Vries, 2020). However, in online interviews, it can be challenging to ensure confidentiality and anonymity because the data may be archived and accessible to service providers, system administrators, or search engines (Opara et al., 2021). Participants were informed about the security, accessibility, and length of data storage, and even after the removal of identifiers, they may still be identified in a publication if quoted verbatim (Zia et al., 2020). Participants had the right to retract any information they did not want to be used, and the researcher respected their wishes to avoid negative implications for the participant and loss of trust for the researcher (Turhan et al., 2019).

c) *Validity and reliability issues*: In qualitative research, validity is concerned with ensuring that the findings are accurate from the perspectives of the participants, researchers, and readers of the final account (Hayashi Jr et al., 2019). To maintain validity, the questions were relevant to the research question and were prepared in advance of the interviews. Sufficient time was allocated to each interview, and the timing of each interview was appropriate. Triangulation, which involved using both survey and interview data, was used to ensure the validity of the data. Rich description was used to give readers a realistic impression of the data and to allow them to hear the participants' voices (Creswell & Creswell, 2017).

   To avoid bias, the researcher sought peer review of the themes by individuals who were not involved in the research process (Ronkainen & Wiltshire, 2021).

d) *Reliability*: This indicates that the research approach is consistent and well-documented (O'Connor & Joffe, 2020). Procedures to ensure reliability included analysing transcripts before the interviews to ensure that they were error-free. The themes that emerged were consistent across all data during the analysis, and notes were taken to define the themes (Creswell & Creswell, 2017).

e) *Validity*: Validity in qualitative research is concerned with how well the findings represent true findings among similar individuals outside the study and how accurately the method used in the study measures what it is intended to measure (Weakley et al., 2021). This study's validity was ensured through the use of triangulation, which involved using both qualitative and quantitative data collection methods. Themes were established based on the converging perspectives gained from the study participants. However, the possibility of the researcher's bias in the identification and formation of themes within the data was a threat to the study's validity (Clifton, 2020). The objective of qualitative case studies is to ensure that the research quality confirms the findings that can be incorporated into business practices (Hayashi et al., 2019). The study's credibility, transferability, dependability, and confirmability were all employed

to ensure its qualitative method resulted in validity and reliability (Mandal, 2018).

f) *Dependability*: This refers to the consistency of findings among researchers in the same study. Maintaining consistency is critical, regardless of which researcher is collecting the raw data or using the same sample (Boucerredj & Debbache, 2018). Due to the inherent bias and subjectivity present in most qualitative studies, achieving dependability can be difficult. A double coding process and reflexivity can aid researchers in confirming dependability and reducing bias (Hayashi et al., 2019; Korstjens & Moser, 2018). Reflexivity was exercised at the beginning of this study to promote transparency, and member checking was used to validate and confirm participants' responses during the interview (Caretta, 2016).

g) *Credibility*: This pertains to the extent to which the study's findings correspond to the reality of the world we live in, thereby establishing the truth of the findings (Fleming et al., 2021). To ensure credibility, this study utilised member checking and triangulation. The researcher provided summaries of the interpretation of responses during interviews to the participants who then performed member checking to ensure the accuracy of interpretations. Additionally, methodological triangulation using surveys and interviews was implemented to compare the interpretation of interview responses with the analysis of data collected from the survey.

h) *Confirmability*: This criterion relates to the confidence that the study's findings are based on the participants' words and stories and not on the researcher's latent bias (Nassaji, 2020). An audit trail, which is a detailed record-keeping approach, demonstrates that the results are based on the participants' accounts and contains a transparent description of how the data was collected and analysed by the researcher (Carcary, 2020). The researcher used themes to explain how each code worked against the theme and as a rationale for grouping the codes. Bias was mitigated by using a retrospective diary and obtaining comments from participants after the interview. Methodological triangulation

was used to ensure the corroboration of the interpretation of participants' responses in the survey analysis.

i) *Transferability*: Evidence is provided to demonstrate that the study's findings could apply to other contexts, situations, times, populations, and organisations of the same nature (Nguyen, Hassner, Seeger & Archambeau, 2020). The researcher thoroughly described the phenomenon under study, the context, data collection techniques, and analysis methods in Chapter Two. The research findings for both the qualitative and quantitative methods are believed to be sufficient to enable other researchers to evaluate the extent to which the study findings can be transferred to other public sector organisations in African contexts and populations.

j) *Data saturation*: This means that no additional data can develop properties of the category. As the results become similar in all instances repeatedly, the researcher becomes confident that a category is saturated. The analysis of data can no longer differ because the responses keep being the same from one interview to the other and cannot lead to any new interpretation, themes, or codes (Fusch & Ness, 2015). Probing questions and member checking can help researchers determine if they have reached data saturation. Researchers may also implement methodological triangulation to check for data saturation (Saunders et al., 2018). To check for the possibility of data saturation in this study, probing questions were asked during the semi-structured interviews. Data saturation occurred when new themes and patterns stopped emerging with the twelfth participant.

3.10.3 Qualitative data analysis

Thematic analysis (TA) was chosen as the non-numerical data analysis technique for this study to analyse the qualitative data. TA requires simultaneous data collection and analysis, which involves constantly switching between collecting and analysing data (Braun & Clarke, 2006). It is a classification strategy for qualitative data (Lewis, 1995) that provides a flexible and useful data analysis process and produces a rich, detailed, and complex data representation (Braun &

Clarke, 2006). Thematic analysis differs from the grounded theory method of Glaser and Strauss (1967) by capturing frequently repeated patterns across datasets to help researchers discover patterns and develop themes within the data. However, the thematic analysis does not require researchers to agree to the implicit theoretical commitment of a grounded theory (Braun & Clarke, 2021). In this method, researchers identify, analyse, and report patterns in qualitative data, which need to be geared towards theory development similar to grounded theory (Corbin & Strauss, 2015; Glaser & Strauss, 1967; Holloway & Todres, 2003).

Thematic analysis is often used by qualitative researchers to answer research questions about people's experiences and perspectives and report the meaning and reality of the participants. Researchers explore how reality, meaning, and experience influence an individual's perspective, or how individuals give meaning to their experiences and how the broader social context influences those meanings (Boyatzis, 1998; Braun & Clarke, 2006). In the current study, individual, in-depth, semi-structured interviews were conducted to collect data from participants. The researcher invited participants to share their perspectives on ERP implementations and their experiences in integrating business strategies. Participants were also asked to talk about the challenges and barriers in customising ERP systems and digitising knowledge management. Towards the end of the interview, the researcher asked participants to add anything they thought was relevant to the discussion. Two participants were interviewed for a pilot study to rate their guide. Data from this interview were excluded from the final data set, and two participants were not included in the sample. Concurrent data analysis allowed researchers to modify the interview guide for future interviews according to concepts or issues identified in pilot interviews.

The study used audio recordings of each interview, which were transcribed verbatim. The transcripts were sent to participants for review, and the researcher coded the transcripts to identify common and distinct themes. This process followed the six phases of thematic analysis as described by Braun and Clarke (2006). NVivo version 12 was used to support the analysis and manage the interview data.

During the initial phase of data analysis, the researcher read and re-read the transcripts to achieve full immersion in the data. The researcher annotated the text with initial ideas in the wide margin, making notes of thoughts, observations, and reflections on participants' narratives. Jackman et al. (2020) suggest that annotations should adhere to specific criteria. The researcher then identified inter-relationships, connections, and patterns between the initial annotations to develop themes. The researcher looked for connections across emergent themes and identified and explored oppositional items. The same analytical process was repeated for each case. The researcher identified patterns across cases and the most important findings related to the participants. Code categorisation, patterns, and theme identification helped the researcher to analyse the data more effectively. The researcher did not anticipate the direction of the conversation during the interviews.

3.10.3.1 Advantages of thematic analysis

TA is a highly flexible approach that can be easily adapted to meet research needs, providing a rich, detailed yet complex data presentation without requiring pre-configured categories, codes, and themes (Braun & Clarke, 2006, 2013, 2021). Unlike other approaches, TA is unsupervised, making it easy to capture unknown phenomena without the need for algorithm training. Additionally, because TA is thematic, it requires less theoretical and technical knowledge than other qualitative approaches and is thus more accessible (Braun & Clarke, 2006, 2013, 2019). Moreover, TA is easy to learn and understand, with few regulations or procedures (Braun & Clarke, 2006, 2019), and has proven useful in summarising key features of research datasets, enabling researchers to use a well-structured approach to data management and delivering a clear, well-organised final report (Kiger & Varpio, 2020).

TA also provides researchers with the flexibility to make changes to the research design and objectives during the research process. As TA does not require following a prescribed set of rules, researchers have the freedom to develop their own approach to thematic analysis, enabling them to dig into the data without preconceptions and generate real codes from the data. This authenticity ensures a

true picture of the underlying concept, shares the content, and explains the research reasons, while helping to understand these aspects through a different lens.

TA is particularly useful for answering difficult research questions (Braun & Clarke, 2019). While most analysis types have specific rules for conducting research, TA does not bind researchers to a specific set of rules, making it a popular choice. In this study, the researcher chose TA as individual experiences were significant, and TA provided a deeper understanding of these experiences.

3.10.3.2 Limitations of thematic analysis

TA has limitations that should be considered when choosing this research method. One disadvantage of TA is that it is phrase-based, and the meaning may be lost in a complex narrative (Byrne, 2022). For instance, the tone of a client's email response may be misunderstood, leading to inaccurate interpretation. TA may also generate diverse types of themes from the data simultaneously, causing difficulties in managing the data and losing focus on the research objectives. This distraction may result in a loss of important data and difficulties in differentiating between the themes and codes (Byrne, 2022).

Although TA is considered an accessible method for beginner researchers, it may also distract them from their objectives and decrease the importance of the study's theoretical framework (Braun & Clarke, 2021). Researchers using TA are encouraged to apply their knowledge, which makes them focus on their subjective experiences and ignore the study's theoretical framework. This approach may result in researchers ignoring the themes that do not meet theoretical framework requirements, but those that pop up from the data.

Another limitation of TA is that it does not have any technical claim about the use of language, and the data can be in any form or language. This may include any of the 11 South African languages (Silaigwana & Wassenaar, 2019). Conducting interviews in different languages may create a language barrier that makes data difficult to analyse. Researchers may stick with the theoretical framework and let go of digging into the data to understand its meaning related to their individual

experiences, thus ignoring the themes that do not meet theoretical frameworks' requirements but those that arise from the data (Scharp & Sanders, 2019).

3.10.4 Coding process

In the coding process, each participant in the study was assigned a random identifier that grouped them according to their position in the organisation. The coding of responses collected during the interviews began with the random identifier and was followed, in order, by each step of the ERP implementation process. At the end of each interview, responses were decomposed into groups, and the coding was extended to each group according to their responses for traceability. Once all responses were counted, NVivo was used to perform multiple regression tests on the study's results.

The data compilation process began by collecting and categorising data to develop an organised database that stored the raw data efficiently (Rivas, 2012). The interview recordings were transcribed, the collected organisational documents were reviewed, and the thematic analysis process was used to code and identify themes from the qualitative research (Lang et al., 2011). Thematic analysis was then used to analyse the interview transcripts to understand the participants' explanations of events related to ERP implementation in the organisation. Finally, the data was compiled using Microsoft Word and Microsoft Excel before being disassembled using NVivo software.

The researcher disassembled the data into nodes and created codes from each of those nodes using NVivo. Emerging themes were then developed from these codes, and all data fragments were grouped into nodes. The data nodes were then disassembled into thematic groupings to prepare them for the data reassembly phase (Adu, 2019). The researcher reassembled the data by thematically sorting, arraying, and organising the data fragments into logical groups (Yin, 2018). During the reassembly phase, the researcher maintained consistency in the study by coding the data to develop themes and patterns to group information and connect the fragmented data.

The researcher reviewed the codes to ensure that the themes made sense before synthesising all the reassembled data and developing narratives (Järvinen & Mik-Meyer, 2020). The researcher made sure to resist any urge to shape data into desired outcomes (Yin, 2018). The narratives were developed to gain a deep understanding of the ERP implementation strategies at NYDA and answer the research questions of this study.

The transcribed interviews were imported from MS Teams recordings into NVivo after data was collected from semi-structured interviews. The data was analysed into nodes, labelled with codes, and developed into emergent themes and subthemes. The emerging key themes were correlated with the literature review on the NYDA ERP implementation, as well as with the conceptual framework for this study.

3.10.5 Quantitative data collection

The researcher distributed a structured online questionnaire to junior staff members of an organisation. The questionnaire was accompanied by a consent form and a guide on how to complete the questionnaire, and responses were collected using Google Surveys. The questionnaire method was chosen as it is designed to collect precise information and can supplement data collected using the qualitative method, check previously accumulated data, and validate hypotheses (Krosnick, 2018).

This method was deemed suitable for the study as it gathers data from a wider perspective in the quantitative phase. The questionnaire has several advantages over the interview method, including the ability to generate responses from a large sample at a low cost, provide anonymity, and reduce biased interactions (Savill et al., 2018). Anonymity was provided to the selected sample to encourage honest expression of perceptions and views without fear of job-related consequences (Cohen et al., 2017).

According to Patten (2016), the questionnaire method facilitates quick data collection as the researcher does not need to be present when respondents complete the questionnaire. This is particularly useful for large populations such as junior

staff members, for whom conducting interviews would be impractical. Although respondents may lie due to social desirability bias, this instrument is still an effective means of measuring behaviour, attitudes, preferences, opinions, and intentions of subjects in a cheaper and quicker manner than other methods (Krosnick, 2018). The researcher continuously monitored responses, tracking and sending reminders to non-respondents to improve response rates.

This method of data collection provides uniformity in responses as all participants are presented with the same questions. Arsenault-Lapierre et al. (2021) emphasise that surveys are an affordable research method. Invitations to participate in the questionnaire were sent to groups by position using the organisation's email, excluding senior staff members, to avoid any bias interference from the researcher. Respondents were allowed to answer the questions in their own words, taking their time to think and answer (Berry & Welsh, 2010), which made it convenient to reach scattered respondents.

Unfortunately, there is a high risk of collecting inaccurate and incomplete information with questionnaires as some respondents may not understand the questions correctly or may be interrupted during the session and never complete it. With COVID-19 restrictions and more respondents working from home, they may not be as active in responding to the questionnaire as they would be in the office.

Scholars have outlined the advantages and disadvantages of online research methods. Researchers can choose whether to use face-to-face, mail, online, or telephone surveys based on their preferences and reasons. The lack of an interviewer reduces social desirability bias, as respondents may provide answers they assume the interviewer expected to hear (Ahmadian & Ercan, 2021), and ensures that each respondent receives the survey questions in the same way (Elliott, 2018). The main advantages of online surveys are the greater speed and lower cost at which they can be conducted. Surveys accumulate a large volume of responses in a short space of time, and a minimum fieldwork period is recommended to ensure good coverage (Thrusfield & Brown, 2017). Therefore, the speed of response becomes no more of an advantage for online surveys than for face-to-face surveys, given a sufficiently large field force.

Online surveys offer advantages such as being more visual, flexible, and interactive compared to other data collection methods (Ball, 2019). Unlike face-to-face surveys, online surveys are conducted among respondents from a panel who have agreed to be contacted for research purposes. Sampling bias and selection errors are avoided by repeatedly sending the survey request until a representative sample is achieved. However, not all invited participants respond, which can limit the generalisability of the results (Frandell et al., 2021).

The validity and reliability of online surveys depend on the questions being reasonable and relevant for collecting the necessary data from participants. The questions must be focused on the research topic and related areas and not go beyond this scope. In this study, the survey questions focused on whether the KM was appropriately aligned with ERP implementation. The questions were designed to elicit answers that are generalisable for the entire target population, and the results were compared with those obtained from interviews to ensure validity. The questions were also designed to elicit similar information from respondents to ensure the reliability of data collection.

3.10.6 Development of the survey instrument

To examine the relationship between KM and ERP implementation in the organisation and the experiences of junior staff members, a self-administered questionnaire was utilised (Fonseca et al., 2021). Closed-ended questions were mainly used in the survey, with a finite set of responses provided, and scales used to measure responses. For various aspects of ERP implementation, a five-point Likert scale was employed. Rather than using numeric labels, response options were labelled as “Disagree, Partially Disagree, Cannot Determine, Partially Agree, and Agree” for clarity. Additionally, open-ended questions were used to accommodate unanticipated responses and allow respondents to provide further elaboration, thereby facilitating a deeper understanding of the responses (Neuert et al., 2021).

According to the literature, ERP implementation involves change and integration of all products in an organisation, and it is crucial to prepare users and direct their mindsets towards the change, particularly when new software is being implemented

(Obara, 2018). Technological advancements in organisations improve employee performance in the field by enhancing their knowledge, addressing weaknesses and increasing employee satisfaction (Obara, 2018). Knowledge management is highly essential when implementing an ERP system. However, this must be done with care as employees may resist changes (Ramdani & Hadijah, 2020). In the survey, the respondents were asked about their attitude towards ERP implementation and their satisfaction with the training received when the ERP was implemented in the organisation's system.

The QUAN strand of this study utilised a probability simple random sampling technique to recruit participants. This sampling procedure ensured that every member of the population had an equal chance of being selected for the sample (Berndt, 2020). This method is particularly useful when studying a specific subgroup within a larger population. During the survey period, 198 questionnaires were sent to district and centre coordinators, administrators, officers, and general workers in the organisation via email. Out of these, 115 valid responses were received. The sample of valid responses excluded four questionnaires that were not filled in properly and eight participants who did not complete the questionnaire.

3.10.7 Ethical compliance

The researcher was obliged to obtain informed consent from each participant to ensure they comprehended and acknowledged the advantages and potential risks associated with participating in the survey. The consent statement also addressed the POPI Act No. 4 of 2013, stating that the collected information would be kept confidential and that the participant's identities would remain anonymous. As the survey was self-administered online, the informed consent was presented on the survey's homepage and included a statement affirming the confidentiality of responses. To proceed with the survey, participants had to click on the "Yes, I agree" button.

Participants were informed that they had the right to withdraw from the study at any point and that there was no remuneration for their participation. The use of an

emailed survey for data collection provided a secure, convenient, and cost-effective method for obtaining responses from participants (Keusch & Yan, 2019).

3.10.8 Quantitative data analysis

Inferential statistics were used to generalise findings to a larger population based on a representative sample of the population participating in the study. Cramer (2003) identified three major factors that could influence data analysis, including the level of measurement of variables, the use of data for descriptive or inferential purposes, and ethical considerations. The study employed descriptive statistics such as mean and standard deviation, and presented their frequencies in tables and graphs. Cronbach's alpha test was also conducted to verify the reliability of the questionnaire. Regression analysis was utilised to estimate the coefficients of the linear equation using the independent variables that best predicted the value of the dependent variable, ERP implementations, and skewness and kurtosis tests were used to assess normality. Statistical software SPSS V24 was used for the analysis.

3.10.9 Psychometric testing of the measuring instruments

Psychometric testing of instruments involves the application of specific research methods designed to evaluate the amount of error contained within an instrument, which is its reliability, or within the data produced by using the instrument, which is its validity (Clark et al., 2018). In this study, a pilot study was conducted with four quantitative respondents and two qualitative respondents to evaluate and enhance the validity and reliability of the measuring instruments. The researcher needed to measure the error for reliability and validity consideration (Srinivasan & Lohith, 2017). The interval between the testing times is mostly determined by the nature of the measure. In this study, the respondents did not experience rapid changes concerning the ERP implementation, which led to shorter intervals that were appropriate for psychometric testing of stability.

3.10.9.1 Validity testing

n a quantitative study, validity refers to the degree to which the results accurately measure what they are supposed to measure (Keusch & Yan, 2019). In this study,

validity was used to measure the satisfaction of the application of KM on the ER system. It is essential to consider both the validity and reliability of the data collection instruments (i.e. questionnaire and interviews) when conducting research.

To test the effectiveness of the questionnaire, the researcher conducted a pilot study, also known as a feasibility study. According to Fraser, Fahlman, Arscott & Guillot, (2018), pilot studies are practice tests that researchers can use to assess research tools such as questionnaires and interviews. The researcher conducted the pilot study to determine the feasibility of ERP implementation in terms of employee understanding and their overall impression of the new system. The pilot study aimed to obtain feedback from respondents and identify any necessary adaptations to the questionnaire. Based on the respondents' suggestions, some questions were replaced, and others were clarified.

Validity is crucial for providing a measure of the degree of confidence that can be placed in the inferences drawn from the scores on the instrument (McMonnies, 2018). It is about the interpretation of scores generated from an instrument used to collect data (Clark & Watson, 2019). However, it is important to note that the reliability of an instrument used to collect data may not necessarily constitute the validity of data when used for specific purposes or with particular groups of respondents, such as different ethnic groups (Rose & Johnson, 2020).

To ensure validity, the researcher obtained information sets from various respondents occupying different positions within the organisation to establish an evaluative judgement on the questionnaire. This approach allowed the researcher to determine whether the questionnaire had measured what it was intended to measure and continued to measure the same construct.

a) Content validity

To ensure content validity, the researcher needed to ensure that the questionnaire covered an adequate sampling of the content area of the variables being measured. The questionnaire items represented a broad range of knowledge management and

enterprise resource planning implementation areas being studied, including all district offices and the head office where junior staff members are located (Shrotryia & Dhanda, 2019). The researcher analysed whether the components of the questionnaire were related to the attributes being measured. This validity allowed the researcher to evaluate the consistency of the questionnaire as a quantitative data collection method and assess whether it met the purpose for which it was proposed. It also helped the researcher evaluate the number and relevance of the proposed items for the study (Almanasreh et al., 2019; Retno et al., 2021; Zawawi et al., 2020).

b) Face validity

The researcher used face validity to determine the readability and clarity of the questionnaire content. Face validity aimed to assess whether the questionnaire clearly and unambiguously assessed the construct and identified whether the measured concept of the study was intended by the researcher (Moulton et al., 2019). The questionnaire used in this study underwent input from the ethics committee, who critically evaluated the instrument, commented on its content, and gave ethical clearance.

c) Construct validity

Construct validity aims to determine how well the questionnaire reflects the concept being studied (Turhan et al., 2019). The researcher established the construct validity of this study through principal components analysis. Items loading > 0.70 on one factor provided support for construct validity (Bedford & Speklé, 2018). It was essential for the researcher to examine the theoretical relationship between the questionnaire items and the concepts contained in the theory and provide evidence for the interpretation of the hypothetical proposed relations values of construct association concerning other constructs for the study.

d) Criterion validity

Criterion validity refers to the correlation of an instrument with another instrument that measures the same variable of interest. In this study, criterion validity was

established by comparing the results of the questionnaire with the interviews. Criterion validity measures the degree to which one instrument produces results like those of other existing and valid instruments that evaluate the same construct (Clark & Watson, 2019). There are two types of criterion validity: concurrent and predictive. Concurrent validity is established when the criterion measure and the produced measure are administered simultaneously, and there is any correlation between both instruments (Levante et al., 2020). Predictive validity occurs when the produced measure predicts future events, and data collection occurs at various times (Clark & Watson, 2019).

3.10.9.2 Reliability testing

In the context of this study, reliability testing evaluates the degree to which the research instrument is free from error (Revelle & Condon, 2019). It is important for an instrument to be consistent over time and between users in order to establish reliability. In this study, consistency reliability was evaluated by calculating Cronbach's alpha coefficient for the development sample with $\alpha \geq 0.70$, which was considered acceptable (Kaur & Paruthi, 2019). Furthermore, reliability estimates were conceptualised as the consistency with which the scale could differentiate between two individuals with different true abilities, and were calculated for the validation sample at different ability thresholds (theta −2, −1, 0, 1, 2) using the IRT model. The reliability coefficients ρ were defined as the variance of the fitted model (1.0) minus the error variance at the respective ability data point (Doble et al., 2019). In this way, the researcher could establish the reliability of the instrument and ensure that it consistently reproduced results when applied at various times.

3.10.9.3 Multicollinearity testing

Multicollinearity occurs when there is a perfect or almost perfect linear relationship among some or all explanatory variables, as well as the presence of an inter-correlation among them (Tay, 2017). To assess for multicollinearity in both models, the Variance Inflation Factor (VIF) was estimated. If the VIF of a variable exceeds 10, it is considered to be highly collinear (Kim, 2019). In this study, multicollinearity was found not to be an issue in the model.

The presence of multicollinearity may lead to inaccurate results of regression coefficient estimation when investigating relationships between independent and dependent variables (Putri, Purwanto, Pramono, Asbari, Wijayanti & Hyun, (2020). To check for the presence of multicollinearity in the collected data, tolerance and variable inflation factor assessments can be used. Tolerance is a value that measures the degree of an independent variable that is not explained by the other independent variables in the model. On the other hand, the VIF is the inverse of tolerance and is calculated simply by inverting the tolerance value. To be considered tolerant, the value should be less than 0.10 and VIF should be more than 10 (Sulaiman et al., 2021). The tolerance and VIF values resulting from the analysis of standard multiple regression between the independent and dependent variables can easily examine the multicollinearity among independent variables.

3.10.10 Mixed data analysis

The researcher employed mixed data analysis by converting coded qualitative data into codes used in statistical analysis, with a clear rationale for demonstrating data convergence. The integration of interview and questionnaire data was achieved by systematically matching it to respondent information from rating scales and survey responses using NVivo software (Onwuegbuzie, 2019). The analysis process involved a proper conceptualisation to ensure a flawless abstraction or coding of data into emergent categories (Johnson, Grove & Clarke, 2019). This was achieved by transforming data into themes and codes, correlating and comparing data by quantifying the qualitative data sources and vice versa. The next step was to consolidate data by combining both quantitative and qualitative data to create consolidated variables. Lastly, the researcher integrated both qualitative and quantitative data to obtain conclusive results.

3.11 Chapter summary

This chapter on research methodology outlined the process of conducting research to generate new knowledge (Saunders et al., 2019). The research adopts a practical philosophy and employs a combination of inductive and deductive reasoning along with denotative reasoning to address research questions and achieve research

objectives. Inductive reasoning is applied first due to the lack of empirical knowledge and theory in the integration of KM with ERP implementations, followed by deductive reasoning (Venkatesh, Vignesh, Srinivasan, Palanisamy, Elavarasan, Bhuvaneswari, ... & Raza, 2021).

The qualitative phase of the research involves the collection of qualitative data in the form of semi-structured interviews with open-ended questions and their analysis. The quantitative phase, on the other hand, involves the collection of quantitative data through questionnaires and their analysis. Both data collection methods are carried out simultaneously and analysed together. Since the study focuses on a specific point in time, the period covered in this study is considered cross-sectional.

This chapter provided an overview of the data collection and analysis methods used in this study and their rationale. The chapter also explains how semi-structured interviews and questionnaire surveys were used to collect empirical data, which are further elaborated on in Chapters Four and Five, respectively. The subsequent chapter covers the analysis of quantitative results, as described in Chapter 3Three.

CHAPTER FOUR: QUANTITATIVE STUDY FINDINGS AND ANALYSIS

4.1 Introduction

The previous chapter discussed the research methodology employed in this study. This chapter focuses on the presentation of data collected through the quantitative strand of the study. The primary objective of this research was to investigate the expectations of respondents regarding the ERP and identify the factors contributing to difficulties in its implementation, including its effectiveness as a knowledge management tool within the organisation.

4.2 Response rate

The quantitative data was collected by administering survey questionnaires to junior staff members of the NYDA, with a target population of one hundred and ninety-eight (198). One hundred and fifteen (115) staff members responded to the survey, comprising of twenty-one (21) coordinators, sixty-six (66) officers, twenty-five (25) administrators, and three (3) general workers, all of whom play a direct role in the utilisation of ERP to implement the organisation's products. The survey questionnaires were administered seven months after the initial invitation, and the response rate was 58% of the sample. Mugenda and Mugenda (2003) recommended that response rates above 50% are adequate for surveys and can be considered representative of the population. Therefore, the response rate of this study is sufficient to use the collected data for generalisation and drawing conclusions.

4.3 Demographic information

Out of the 198 target population, only 115 questionnaires were returned, and 83 were uncollectable due to being unfinished or having no response. The demographic information collected from the respondents in this study includes job positions and working experience, which serve as reference points for identifying the characteristics of the respondents.

Table 3.1: Demographic statistics

	Frequency	Percentage
Job Position		
Coordinator	21	18.3%
Officer	66	57.4%
Administrator	25	21.7%
General Worker	3	2.6%
Working Experience		
1-3 years	36	31%
4-5 years	25	22%
6-10 years	31	27%
11+ years	23	20%
Gender		
Male	41	36%
Female	74	64%
Education level		
Master's degree	8	7%
Honours	19	16%
Bachelor's degree	41	36%
National Diploma	33	29%
Other	14	12%
Age		
25 years and under	9	8%
26-30 years	18	16%
31-35 years	37	32%
36-40 years	39	34%
41+ years	12	10%

Out of the 115 respondents, the majority of the junior staff members, 66 (57.4%), hold the position of officers, including outreach officers, business development officers, jobs officers, or training officers. Administrators were the second-largest group of respondents, with 25 (21.7%) followed by coordinators with 21 (18.3%), while only 3 (2.6%) were not general employees.

In terms of working experience, the largest group of respondents, 36 (31%), had been working for 1 to 3 years. The next largest group, 31 (27%), had 6 to 10 years of experience. 25 respondents (22%) had been employed for 3 to 5 years, while only 23 (20%) had been working for 11 years or more.

Gender-wise, the respondents consisted of 41 (36%) males and 74 (64%) females. In terms of education level, only 7% of respondents held a master's degree and 16% held an honours degree. The majority, 36%, held a bachelor's degree, 29% held a National Diploma, and 12% had either an N6 or below or other matric certificates. This demographic information aimed to establish whether the level of education had any impact on the usage of ERP and resistance to change among employees. The significant difference in response rate between genders was due to the NYDA having more female employees than males.

4.4 Descriptive analysis

The researcher employed descriptive statistics to investigate data trends and ensure the validity of data used in this study (Cerqueti & Maggi, 2021). In this study, KM is a crucial measure for the successful implementation of the ERP system using all the mediating variables. Therefore, all the mediating factors are significant for the model building of this study. Table 4.2 provides descriptive statistics for the ERP system's implementation using the mediating variables, including the mean, standard deviation, and variance.

The mean represents the average value in a data set, which is important for determining the central tendency of the data. It also helps to aggregate information from each observation into a dataset. The calculation of the standard deviation was necessary to understand the distribution of values in each data set. Finally, the

variance is the average of the squared deviations from the mean, which measures the spread of the data.

Table 4.2: Descriptive analysis for ERP implementation mediating variables

	Mean	*Std Deviation*	*Variance*
Knowledge Transfer	3.7	.442	.182
Organisation Performance Improvement	3.6	.476	.236
Change Management	3.1	.345	.332
Business Process Re-engineering	3.8	.515	.342
Staff Morale and Training	3.9	.474	.172

According to Table 4.2, the respondents highlighted the significance of knowledge transfer in ERP system implementation, as indicated by the mean of 3.7 and standard deviation of 0.442. This suggests that management is willing to share knowledge with subordinates, recognising it as the most critical success factor in ERP implementation projects. Gou, Li, Lyu, Lyu & Zhang (2019) describe top management's knowledge sharing as a necessary resource for ERP project success. Moreover, management's involvement in every step of the ERP implementation, its commitment, and willingness to allocate valuable resources to the implementation effort, are critical for successful implementation (Vaghefi et al., 2018).

The respondents also agreed that change management is a top priority in successful ERP implementation, as indicated by the mean of 3.1 and standard deviation of .345. Change management establishes new working relationships and information sharing among sub-departments while enhancing user involvement according to the requirements of ERP implementation. Employees' resistance to change is a significant obstacle to ERP implementation because they are unaware of the system's capabilities and fear it taking over their work. Thus, staff morale is

affected until training and further explanations are provided on ERP implementation, as reflected in the mean of 3.9 and the standard deviation of 0.474.

Moreover, with a mean of 3.6 and a standard deviation of .476, the respondents emphasised the importance of organisational improvement in ERP implementation. Effective management of the organisation should use skills and knowledge to coordinate scheduling and monitor defined activities to ensure that the implementation project's objectives are achieved.

4.5 Normality test

The normality test was conducted to assess whether the data in the sample followed a normal distribution. A normal distribution indicates that the data is symmetrically distributed around the mean, with the majority of values clustered around the mean and fewer values at the tails. The sample's distribution was compared to a normally distributed set of scores with the same mean and standard deviation. A significant test result would indicate that the distribution is non-normal.

According to Denis (2018), normality tests on small sample sizes have little power to reject the null hypothesis, and hence, small samples usually pass normality tests. On the other hand, meaningful results can be obtained for large sample sizes, even if there is a slight deviation from normality (Denis, 2018; Field, 2013). However, this slight deviation would not affect the results of a parametric test (Denis, 2018).

Table 4.3: Normality test

	Skewness	*Std. Error*	*Kurtosis*	*Std. Error*
Knowledge Transfer	-.213	.232	.722	.422
Organisation Performance Improvement	-1.111	.232	3.187	.422
Change Management	-.079	.232	.584	.422
Business Process Re-engineering	-.451	.232	2.790	.422
Staff Morale and Training	-.331	.232	2.187	.422

The determination of skewness and kurtosis is crucial in this study to measure the symmetry and severity of distribution tails, respectively (Jammalamadaka et al., 2021). Knowing the shape of the data helps identify the concentration of information and analyse the outliers in each dataset. Skewness is used to measure the (lack of) symmetry in a normal distribution (Jammalamadaka et al., 2021), while kurtosis measures the peak of the distribution curve and its shape (Jammalamadaka et al., 2021). A distribution is considered symmetric if it appears identical to the left and right of the centre point, where the mean, median, and mode coincide. A distribution is only considered normal if the skewness or kurtosis (excess) values fall between −1 and +1.

Table 4.3 reveals the results of skewness and kurtosis for all the mediating variables in the study. Bazavov et al. (2020) suggest that skewness values should range between -2.0 and +2.0, while Bai and Ng (2005) suggest that kurtosis values should fall between -7.0 and +7.0. The tests shown in the table above indicate that the data in this study is normally distributed, as the skewness and kurtosis values for all variables fall within the acceptable thresholds.

4.6 Scale reliability

Ensuring the reliability of research instruments is crucial in any study (Clark & Watson, 2019). In this study, the researcher evaluated the reliability of the questionnaire to ensure consistency and validity of results. Cronbach's alpha coefficient was used to determine the internal consistency of the test or scale, which is expressed as a number between 0 and 1 (Taber, 2018). A high value of Cronbach's alpha indicates a high level of internal consistency among the items in the test. In this study, the Cronbach's alpha coefficient of 0.951 (shown in Table 4.4) indicates a high level of internal consistency and demonstrates that the questionnaire was free from errors.

Internal consistency is important in ensuring that all items in a test measure the same concept or construct, and are therefore related to the interrelationship of the items within the test (Taber, 2018). Moreover, internal consistency was determined before the test was used in the research to ensure validity. The interpretation of

reliability is the correlation of the test with itself, and the index of measurement error can be obtained by squaring this correlation and subtracting it from 1.00 (Schrepp, 2020). Cronbach's alpha is a widely used measure of scale reliability (Tavakol & Dennick, 2011), and the high value obtained in this study indicates that the research instrument was reliable and suitable for data analysis.

Table 4.4: Cronbach alpha test for questionnaire reliability

	Questions	**Cronbach's Alpha**	**Composite Reliability**	**AVE**
Knowledge transfer	6-10	.850	.876	.544
Staff morale and training	11-15	.899	.853	.571
Business processes re-engineering	16-20	.824	.811	.498
Change management	21-25	.918	.819	.562
Organisation performance improvement	26-30	.944	.833	.557
ERP implementation success	31-35	.889	.780	.512
Overall	6-35	.967	.901	.667

The average variance extracted (AVE) of the study variables ranges from 0.496 to 0.667, and it is noted that the minimum accepted value for AVE is 0.500, with the lowest value in the table being 0.498. However, considering the proximity of the lowest AVE to the threshold and the overall AVE range, it can be inferred that the reliability measurements are acceptable. Consequently, it can be concluded that the measurement model is valid and dependable.

Table 4.5: Goodness of fit model

Model Summary b			
R	**R-square**	**Adjusted R-square**	**Std. The error in the estimate**
.786a	.744	.700	.268
a Predictors (mediating variables)			
b Dependent Variable (ERP Implementation)			

The correlation coefficient in Table 4.5 indicates a strong linear relationship (r = 0.786) between the dependent variable and the independent variables. The R-squared value of 0.744, adjusted to 0.700, shows that 74.0% of the variation in ERP implementation from the employees' perspective can be explained by the independent variables in the study. The remaining 26% of the variation may be due to other unmeasured factors that were not included in the objectives of the study.

4.6.1 Multicollinearity

Multicollinearity was evaluated in this study to determine whether there were any correlations between the independent variables in the regression model, which should be independent. Correlations between independent variables can cause problems during model fitting and interpretation of the results. To investigate this issue, an exploratory factor analysis was performed on all indicator variables using unrotated principal components, and principal component analysis with varimax rotation was used to determine the number of factors necessary to account for the variance in the variables. This approach was recommended by Shrestha (2020) to control for potential common method bias. In addition, Harman's single factor test was conducted to evaluate for common method bias.

Table 4.6: Common method bias test

	Collinearity Statistics	
	Tolerance	**VIF**
(Constant)		
Knowledge transfer/sharing	.807	1.239
Staff Morale and training	.803	1.246
Business Process Re-engineering	.793	1.261
Change Management	.785	1.274
Organisation performance improvement	.733	1.272
ERP implementation success	.723	1.221

The inverse of the tolerance value is known as the VIF, which is used to examine multicollinearity. According to Senaviratna and Cooray (2019), a tolerance value less than 0.10 and a VIF greater than 10 indicate the presence of multicollinearity. Shrestha (2020) suggested that the tolerance and VIF values resulting from standard multiple regression analysis can be used to assess multicollinearity among independent variables.

To conduct the multicollinearity test, exploratory factor analysis was performed on all indicator variables using unrotated principal component factor analysis and principal component analysis with varimax rotation to determine the number of factors necessary to explain variable variance (Kim, 2019). Variables with a tolerance value less than 0.10 and a VIF greater than 10 are considered to have multicollinearity problems. The results of this study, shown in Table 4.6, indicate that all tolerance values are acceptable, and all VIF values exceed the cut-off point.

4.7 Mediating variables for enterprise resource planning implementation success

All five mediating variables, namely knowledge transfer, staff morale, change management, business process re-engineering, and organisational performance improvement, were analysed to determine their significance for ERP implementation. Each variable was represented by specific items, and a survey was distributed to the respondents, which were analysed to obtain the results.

To analyse success factors for ERP implementation, descriptive statistics of mean and standard deviation were used. The mean indicates the extent to which the respondents on average agree or disagree with the different statements. A higher mean indicates agreement, while a lower mean indicates disagreement.

a) Knowledge transfer

Descriptive statistics, using the mean, were used to evaluate the impact of effective knowledge transfer and sharing during the ERP implementation in the organisation. Table 4.7 presents knowledge transfer, which contains five statements. Each statement relates to the variable and knowledge sharing by the management and vendor to the staff members.

Based on the respondents' responses, all statements were considered to analyse the impact of knowledge management on ERP implementation success. The significance of the system add-ons that the staff members felt was important as they mostly use the system on the ground to implement products, is a relevant factor with a mean of 4.41.

Table 4.7: Descriptive analysis of knowledge transfer

	Effective Knowledge sharing throughout the organisation.	Organisation's ability to refine the processes in improving profitability based on information provided by ERP	Organisation's ability to continually examine and improve the process flow to fit with the system.	Organisation's ability to leverage ERP-related knowledge in facilitating the performance of the organisation.	Proper alignment of ERP to the staff KPIs was communica-ted throughout the implementa-tion.
N	115	115	115	115	115
Mean	3.82	3.66	4.41	3.22	4.13
Std. Deviation	.442	.543	.866	.673	.786
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

The results of the analysis of the knowledge transfer variable suggest that the alignment of ERP to the Key Performance Indicators (KPIs) and effective knowledge sharing are the most significant factors with mean scores of 4.13 and 3.82, respectively. The explanation of the need to adopt the ERP system and the contact made with staff members who implement the products are also relevant with mean scores of 3.66 and 3.22, respectively. These mean values indicate that the respondents agreed on the importance of knowledge transfer for successful ERP implementation in the organisation.

b) Staff morale

The descriptive analysis of staff morale is captured in Table 4.8.

Table 4.8: Descriptive analysis of staff morale

	Uncertainty about current job loss	Overall attempts of involving all employees in decision-making regarding ERP	Management of the workload effectively	A fully functional, correctly aligned, and easy-to-use ERP	Full support and technical team for the hiccups
N	115	115	115	115	115
Mean	3.79	2.77	2.19	2.05	1.85
Std. Deviation	1.472	1.208	.700	.941	.995
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

The level of agreement of staff morale was represented by five statements and measured on a Likert scale. From the data collected, respondents were uncertain about their job placements with a mean of 3.79, the involvement of employees in decision-making regarding ERP implementation with a mean of 2.77, and effective management of workload with a mean value of 2.19. Respondents less agreed about the alignment of ERP and its easy-to-use implementation to the products they work with (mean value of 2.05) and the availability of ERP technical support (mean value of 1.85).

c) Business process re-engineering

Table 4.9 reveals that the strongest link between ERP implementation and an organisation's overall strategy is demonstrated by the highest mean score of 3.53. This is because ERP alters the traditional approach of strategy implementation, making all processes faster and enabling better performance measurements than the

traditional system, which has a mean score of 3.41. Furthermore, BPR is a significant factor in ERP implementation, as evidenced by a mean score of 3.32. ERP implementation enhances the measurement of critical business processes, as seen in a mean score of 3.33. Lastly, the alignment of the ERP implementation and accurate migration of data from the traditional system to the ERP is crucial, as shown by the mean score of 3.17. Collectively, these BPR factors contribute to the success of ERP implementation and the satisfaction of ERP users with the system, leading to faster operations and reduced operational costs. Nonetheless, the mean value of the survey results indicates that BPR is an insignificant factor in the success of ERP implementation in the organisation.

Table 4.9: Descriptive analysis of Business Process Re-engineering

	It is important for the accurate migration of data from a traditional system to an ERP	BPR is a significant factor in ERP implemen-tation	Implementation of ERP has set an overall strategy linked to all the products of the organisation	Implementation of ERP has helped in mapping a mission-critical business process	ERP implement-tation has helped with the understand-ding of perfor-mance measure-ments better.
N	115	115	115	115	115
Mean	3.17	3.32	3.53	3.33	3.41
Std. Deviation	.418	.364	.667	.347	.618
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

d) Change management

The mean values of change management with the impact of ERP implementation were summarised and presented in Table 4.10. The table demonstrates that effective monitoring and evaluation of every step of the ERP implementation received the highest mean value (M=3.61), followed by staff members continually being reminded and taught about the benefits of the ERP (M=3.56). The organisation's readiness for the adoption of the ERP system was evaluated and recorded a mean of 3.45. Communication with the staff members about changes in their responsibilities and reducing their uncertainty regarding job loss was essential for successful ERP implementation and recorded a mean of 3.38. Lastly, the significant changes that the new system brings to the organisation were managed, with a mean of 3.38.

Table 4.10: Descriptive analysis of organisational change management

	There has been constantly monitoring and evaluation of ERP implementation	There has been a continuous reminder of the perceived benefits of ERP Implementation	The organisational readiness to change has been regularly assessed throughout the ERP implementation	Job changes were communicated before ERP implementation	The change management initiative from the old systems to the new system was managed
N	115	115	115	115	115
Mean	3.61	3.56	3.45	3.38	3.38
Std. Deviation	.556	.534	.723	.787	.646
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

i. Organisational performance improvement

Table 4.11: Descriptive analysis of organisation performance improvement

	The introduction of ERP has brought transparency to all the processes of the organisation	With ERP in place, the organisation is in a fully automated mood	ERP has brought more client satisfaction and faster service delivery	Real-time reports are more meaningful with ERP than with the traditional system	A centralised system makes the flow of information quite easy and quicker decision-making.
N	115	115	115	115	115
Mean	3.68	3.57	3.48	3.35	3.18
Std. Deviation	1.56	.572	.706	1.61	1.68
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

The mean values associated with the performance improvement brought about by the ERP implementation in the organisation are summarised in Table 4.11. According to the table, employees feel that transparency is the most prominent feature of the ERP, with a mean of 3.68. Automation of all processes follows with a mean of 3.57. The organisation's struggle with client satisfaction is reflected in its mean value of 3.48, and quick decision-making is facilitated with a mean of 3.35. The ERP's centralisation of all necessary information is reflected in a mean of 3.18. The summary of the mean values indicates that all factors have improved since the ERP implementation project in the organisation.

e) ERP implementation success

Table 4.12: Descriptive analysis of ERP implementation success factors

	The top management has been committed and involved in the ERP implementation process.	The ERP is flexible and allows for customisation while giving adequate information.	ERP provides accurate, timely, dependable, simultaneous, and significant information.	The ERP implementation has brought about plans to optimise organisation processes.	Data migration from the traditional system to ERP has been done accurately.
N	115	115	115	115	115
Mean	3.32	2.84	3.31	3.00	2.01
Std. Deviation	.094	.136	.092	.091	.080
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

Table 4.12 shows that the highest mean value among the success factors that ERP implementation brought to the organisation was the management's commitment to the implementation process, with a response mean of 3.32. This was observed mainly in the HR sub-unit, which used the ERP system for processes such as advertising positions and conducting performance reviews. Accurate and easy-to-use ERP software had a mean value of 3.31, followed by business process optimisation with a mean of 3.00. Flexibility and customisation with adequate information on ERP gained a mean value of 2.81, while data migration from the traditional system to the ERP system had the lowest mean value of 2.01. The integrated systems provided by ERP software allow for better monitoring of business performance through shared information.

Improved customer satisfaction, improved organisational performance, increased flexibility, reduced quality costs, improved resource utilisation, improved information accuracy, and improved decision-making capability are some of the intangible benefits of ERP implementation (O'Leary, 2002).

4.8 Regression analysis

The aim of conducting a regression analysis was to establish the relationship between each independent variable and the dependent variable. Freund et al. (2006) suggest that interpreting regression coefficients involves plotting the average change in the dependent variable for every 1-unit change in one independent variable while holding all other independent variables constant. Regression analysis is a dependable approach for identifying the variables that have an impact on the areas of interest (Chukhrova & Johannssen, 2019). The regression process allowed the researchers to determine which factors were significant, which ones were insignificant, and how these factors interacted with each other.

In statistics, the null hypothesis is a statement that indicates there is no significant difference between two or more datasets collected in previous studies (Goymann et al., 2019). Null hypotheses are typically assumed to be true unless sufficient and conclusive evidence has been gathered to indicate otherwise. Once evidence is

collected that challenges the null hypothesis, the alternative hypothesis can be considered as true.

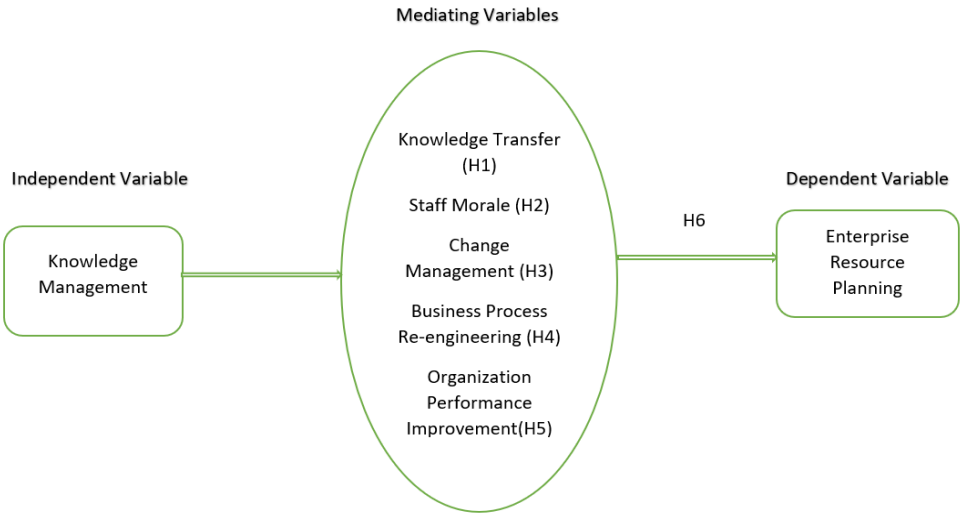


Figure 4.1: Conceptual framework

a) H_1: There is a positive significant association between knowledge management and enterprise resource planning through the mediation of knowledge transfer from the perspective of the managers of the organisation.

Table 4.13: Simple regression analysis H_1

R	Beta	R^2	Adjusted R^2	F-Value	P-Value
.644a	.608	.582	.453	25.677	0.028*

Note. *Significant at $p \leq 0.05$

Based on the results presented in Table 4.13, it can be observed that the calculated F-statistic is 25.677, which is significantly lower than the set alpha level of 0.05. This indicates that there is a significant statistical impact of knowledge sharing by the management on the success of ERP implementation in the organisation.

Furthermore, the beta coefficient suggests that top management has made significant efforts to ensure a smooth flow of information related to ERP implementation, with a strong relationship strength of 60.8%. The adjusted R-square value, which represents the explanatory and predictive power of the knowledge transfer and sharing variables for ERP implementation success, is 58.2%. This indicates a strong association between knowledge management and ERP implementation, leading us to accept the alternative hypothesis.

b) H_2: Effective knowledge management by the organisation has a positive significant effect on staff morale for easier implementation of ERP.

Table 4.14: Simple regression analysis H_2

R	Beta	R^2	Adjusted R^2	F-Value	P-Value
.718a	.621	.614	.533	20.041	0.002*

Note. *Significant at $p \leq 0.05$

A simple regression analysis was performed to investigate the influence of constant knowledge transfer on staff morale, which in turn affects the success of ERP implementation in the organisation. As depicted in Table 4.14, the statistical value F is 20.041 with a level of significance less than 0.05, indicating a significant impact of constant knowledge transfer on staff morale for the successful implementation of ERP. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted. The Beta value demonstrates that there is a positive relationship between the impact of constant knowledge transfer and staff morale on ERP implementation, with a strength of relationship of 60.8%. Additionally, the adjusted R-square indicates that 53.3% of the variance in the success of ERP implementation is attributed to the ERP system matching staff morale, explaining that a one-time change in knowledge transfer will result in a 61.4% change in the success of ERP implementation.

c) H_3: KM that recognises the importance of change management and organisational culture has a positive impact on ERP implementation success.

Table 4.15: Simple regression analysis H_3

R	Beta	R^2	Adjusted R^2	F-Value	P-Value
.814a	.738	.754	.683	10.701	0.00035*

A simple regression analysis was conducted to determine the impact of knowledge management on organisational change management, which in turn affects the successful implementation of ERP. Table 4.15 presents the results, showing a statistical value F of 10.701 with a level of significance less than 0.05, indicating a significant impact of change management on the success of ERP implementation in the organisation. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted. The Beta value demonstrates that the relationship between business change management and the success of ERP implementation is positive, with a relationship strength of 73.8%. Based on the adjusted R-square, the variance of change management on the success of ERP implementation is 68%.

d) H_4: The management of an organisation that acknowledges the user needs as defined by BPR is positively associated with the ERP implementation success.

Table 4.16 indicates that the statistical value F is 21.341 with a significance level less than 0.05, indicating that there is a significant impact of KM on BPR for successful ERP implementation in the organisation. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. The Beta value suggests that the impact of KM on BPR has a positive association with ERP implementation, with a relationship strength of 67.5%. Additionally, the adjusted R-square reveals that the variance of KM on ERP implementation through BPR is 67.1%.

Table 4.16: Simple regression analysis H_4

R	Beta	R^2	Adjusted R^2	F-Value	P-Value
.612a	.591	.675	.671	21.341	0.000*

e) H_5: More extensive use of KM for the aim of organisational performance improvement has a positive significant impact on an enhancement and easier ERP implementation.

Table 4.17: Simple regression analysis H_5

R	Beta	R^2	Adjusted R^2	F-Value	P-Value
.631a	.622	.401	.398	31.311	0.000*

Table 4.17 highlights the results of a simple regression used to assess the impact of knowledge management on the improvement of organisation performance, which in turn affects the success of ERP implementation. The statistical analysis reveals that the F-value is 31.311 with a level of significance less than 0.05, indicating that there is a significant impact of knowledge management on the improvement of organisation performance for the success of ERP implementation. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted for the study. The Beta value demonstrates that sharing organisation knowledge with staff members can improve performance in the organisation and have a positive impact on the success of the implementation process of the ERP. The strength of the relationship between knowledge management and performance improvement reaches 62%. Additionally, the adjusted R-square, which represents the variance of knowledge management on organisation performance that positively impacts the implementation process success, is 39.8%.

f) H_6: A KM that is correctly applied using the mediating variables such as employee morale, organisation improvement, knowledge transfer, business process re-engineering, and change management yields a successful ERP implementation.

This study utilised multiple linear regression to investigate the relationship between knowledge management and the five mediating variables that contribute to the implementation of the ERP system in the organisation. The model was constructed as follows:

$$ERP = \beta 0 + \beta KT + \beta SM + \beta CM + \beta BPR + \beta OPI + \varepsilon$$

Where:

ERP = enterprise resource planning

β0 = scope intercept

βKT = Knowledge Transfer

βSM = Staff morale

βCM = Change Management

βBPR = Business Process Re-engineering

βOPI = Organisation Performance Improvement

ε = Error

The coefficient of determination (R^2) indicates that 69.5% of the variation in the success of ERP implementation can be explained by the variation in the mediating variables, namely knowledge transfer, staff morale, change management, business process re-engineering, and organisation performance improvement. The adjusted R^2 value of 64.5% considers the sample size and independent variables and indicates how well the mediating variables influence the dependent variable, i.e. the ERP implementation system.

Table 4.18: Multiple regression analysis H_6

Constructs	B	Std. Error	Beta	t.	Sig.	VIF
Constant	5.474	1.667				
Knowledge transfer	.189	.052	.608	3.218	.028	1.143
Staff morale	.131	.068	.621	1.217	.002	1.755
Change management	.322	.082	.738	1.023	.000	2.131
Business process re-engineering	.127	.071	.591	1.128	.000	1.811
Organisation performance improvement	.184	.063	.622	2.121	.000	1.461
R^2	.695					
Adjusted R^2	.645					
F-Value	47.663					
Sig.	.000*					

One of the assumptions that must be evaluated before conducting regression analysis is multicollinearity, where the presence of multicollinearity is determined by VIF values above 10, indicating the possibility of multicollinearity (Pallant, 2013). In the table above, the VIF values are 1.143, 1.755, 2.131, 1.811, and 1.461, all of which are below 10, indicating no multicollinearity issues with the data. Homoscedasticity was also assessed to ensure that variances are homogeneous (Field, 2013).

To determine the linear relationship between the dependent and mediating variables and the significance of the model, the researcher used the F-test. The significant F-statistic indicates a linear relationship. The table above shows a significant F-statistic of 47.663 at a 0.10% significance level, and thus the null hypothesis was accepted.

4.9 Hypotheses and results

The hypotheses and results of this study are dealt with in this section.

Table 4.19: Hypotheses and results

Hypotheses	Model	Result
Hypothesis 1	There is a positive significant association between knowledge transfer and enterprise resource planning.	Accept
Hypothesis 2	Effective knowledge management by the organisation has a positive significant effect on staff morale for easier implementation of ERP.	Accept
Hypothesis 3	KM that recognises the importance of change management and organisational culture has a positive impact on ERP implementation success.	Accept
Hypothesis 4	The management of an organisation that acknowledges the user needs as defined by BPR is positively associated with ERP implementation success.	Accept
Hypothesis 5	More extensive use of KM for the aim of organisational performance improvement has a positive significant impact on an enhancement and easier ERP implementation.	Accept
Hypothesis 6	A KM that is correctly applied using the mediating variables such as employee morale, organisation improvement, knowledge transfer, business process re-engineering, and change management yields a successful ERP implementation.	Accept

- **H_1 – Knowledge transfer and ERP implementation success**

The beta coefficient for knowledge transfer is 0.189, t=3.218, p=.028, indicating a significant positive relationship between knowledge transfer and the successful implementation of ERP software in the organisation. The beta coefficient value of 0.189 implies that for every one unit increase in knowledge transfer, there is a corresponding increase of 0.128 in the success of ERP implementation. This finding is consistent with prior studies that have reported a positive relationship between knowledge management and ERP implementation success (Hung et al., 2012; Lee & Lee, 2000; Wang et al., 2007; Xu & Ma, 2008). This suggests that the proper use of knowledge management, specifically knowledge transfer, can have a positive impact on the implementation of ERP software in the organisation. When knowledge sharing and transfer are constant, there is a positive correlation between knowledge management and ERP implementation success. This, in turn, can lead to users experiencing a high-quality system that is accessible and reliable, thereby increasing their task performance (Corral De Zubielqui et al., 2019).

- **H_2 – Staff morale and ERP implementation success**

The beta coefficient for staff morale, as indicated in Table 4.19, is (.131), with a t-value of 1.217 and p=.002, thereby showing that there is a significant positive relationship between knowledge management that acknowledges staff morale and the successful implementation of ERP. A one-point increase in staff morale will result in a (.131) increase in the success of ERP implementation. This finding supports the existence of a positive relationship between positive staff morale and successful ERP implementation, as observed in prior studies (Combs & Michael, 2018; Gill, Amin, et al., 2020; Omar, 2020). Frustration may arise when users try to access information and knowledge from ERP that is not available, hence knowledge sharing plays a vital role in preparing staff members for ERP implementation (Sislian & Jaegler, 2020). Information management is essential in providing the necessary information for long-term planning and decision-making, as the system only stores, accesses, and processes data for daily transactions but does not determine how to use the data, which has a positive impact on staff morale

(Ghani et al., 2019). In conclusion, staff morale has a positive association with the successful implementation of ERP in an organisation.

- **H_3 – Change management and ERP implementation success**

The beta coefficient for change management is .322; t=1.023, p=.000, indicating a significant positive relationship between change management and ERP implementation success. The beta coefficient for change management (.322) suggests that a 1-point increase in change management control by the organisation management leads to a .334 effect on ERP implementation success. This finding aligns with previous studies that highlight the importance of effective change management in successful ERP implementation (Harianja & Anwar, 2019; Najm et al., 2018; Park, 2018). During the system adoption, the organisation underwent a change in business processes across multiple departments to align with the ERP applications. Customizations were made to screening, reports, and business flow to fit the organisation's needs. However, errors occurred in the initial stages, which impacted system performance and information flow. The implementation team addressed the errors, and the information flow was restored. In conclusion, effective change management is crucial to ensure a successful ERP implementation, and there is a positive relationship between change management and ERP implementation success.

- **H_4 – Business process re-engineering and ERP implementation success**

The beta coefficient for BPR from Table 4.19 is (.127), t=1.128, p=.000, and therefore $p < .05$, indicating a significant positive relationship between BPR and successful ERP implementation. The beta coefficient for BPR (.127) means that every 1-point rise in BPR will influence the ERP implementation success by (.127). This finding supports a positive relationship between BPR and successful ERP implementation, as other prior studies have also shown (Dinata, 2020; Tsogkas et al., 2019). Nguyen et al. (2021) suggested that organisations should continuously review and modify their business processes to achieve improvements in cost, quality, service, and operational speed. The more organisations are willing to change their business processes, the more successful ERP implementations will be,

and there should be a correlation between these two variables (Nguyen et al., 2021). Misra et al. (2018) also emphasised that organisational reconfigurability facilitates continuous transformation, allowing novel resources to be received and innovation to be harnessed. Therefore, the conclusion is that BPR has a positive association with ERP implementation in an organisation.

- **H_5 – Organisation performance improvement and ERP implementation success**

The beta coefficient for organisational performance improvement, as shown in the table above, is (.184), t=2.121, p = .000. This p-value being less than .05 indicates a significant positive relationship between KM that promotes organisational performance improvement and successful ERP implementation. Specifically, the beta coefficient for information quality (.184) implies that every 1-point increase in organisational performance improvement will correspond to a (.184) effect on ERP implementation success. This finding supports the positive relationship between organisational performance improvement and successful ERP implementation observed in prior studies (Sutduean et al., 2019; Tarigan et al., 2021). These studies indicate that organisations with prior experience in ERP system implementation have reported increased overall performance following the adoption of ERP. Hunton et al. (2003) found that ERP system adoption improved the financial performance of organisations. Therefore, it can be concluded that organisational performance improvement is positively associated with ERP implementation success in an organisation.

- **H_6 – Correct application of KM through the mediating variables and ERP implementation success**

Based on Table 4.19, the significance level (p) is .000 which is less than the alpha value of .05, indicating a significant positive relationship between ERP implementation and all the mediating variables. The F-test was conducted to determine the linear relationship between the dependent and mediating variables, and the significance of the model. The F-statistic of 47.663 at a .10% significance level rejects the null hypothesis, indicating a linear relationship between the

variables. Thus, this study concludes that there is evidence of a positive relationship between all the mediating variables and the independent variable examined.

4.10 Conclusion

One of the main challenges faced by organisations when implementing a new ERP system is selecting the appropriate software. In this study, the company has chosen an Open-Source ERP system based on Python, which the researcher assumes to be the best available option for the organisation. Another challenge that may arise is ensuring that the ERP system satisfies the technical needs of the organisation and provides easy solutions for customised requirements. However, this may not always be the case, and the ERP may follow traditional processes that do not align with the organisation's needs. Additionally, issues with data quality and completeness may occur when transferring old data to the new system, especially if the vendor did not pilot the program before implementation.

Resistance to change is another significant issue that employees may face when implementing a new ERP system, and this can affect their mindset towards the new system. In this study, employees were unsure whether the ERP system solutions meet the customised requirements of the organisation, as the system is still being tested. Moreover, the data transferred was perceived as poorly done by a significant majority of employees, and the process was not adequately taken into account, leading to errors and confusion among officers. The lack of expertise and limited training were also reported as common issues faced by employees, highlighting the vastness of the system and the potential that is yet to be fully exploited. Furthermore, the absence of a prompt platform to address any queries that may arise while using the system adds to the challenges faced by employees.

The successful implementation of ERP in the public sector is largely determined by the organisation's effective use of KM. This study is based on the theoretical foundation that the use of KM and its mediating variables are essential for successful ERP implementation in the organisation. Specifically, the study investigates the relationship between the proper usage of KM and ERP implementation success by examining the nexus between the two. The five

mediating variables studied are change management, staff morale, organisational performance improvement, business process re-engineering, and knowledge transfer. The study involved 115 junior employees who were introduced to the usage of ERP, and they provided their opinions about the ERP implementation in the organisation by answering questionnaires.

Empirical validation of the ERP implementation in the organisation using a sample of 115 employees indicated that the use of KM in ERP implementation depends on knowledge transfer, staff morale, organisational performance improvement, business process re-engineering, and change management. The results revealed a significant positive relationship between all the mediating variables and ERP implementation success. These findings are consistent with prior research (Jayawickrama et al., 2019; Samiei & Habibi, 2020) indicating the importance of KM in ERP system implementation. Therefore, the study suggests that knowledge sharing is critical for employees to effectively perform their duties when ERP is implemented in the organisation.

4.11 Chapter summary

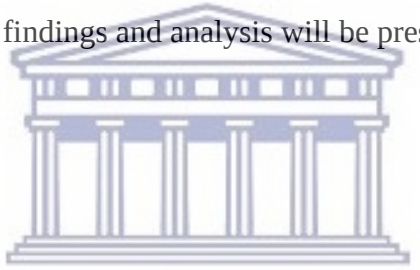
The purpose of the survey was to investigate the research questions related to ERP implementation in the organisation. The results show that the respondents require further training to adequately meet their performance goals. However, respondents expressed dissatisfaction with the vendor's ability to address their needs, suggesting that the employer, who has a better understanding of the organisation's processes and products, should take a more active role in addressing these issues. Efficient and effective information sharing was identified as a top priority for employees, and respondents felt that the organisation should provide them with adequate tools to achieve their targets.

Furthermore, the survey data revealed that the most significant challenges faced by employees during the implementation of the ERP were resistance to change, lack of communication and information sharing, and difficulty in adopting the new system. Employees were also dissatisfied with the support system during the implementation phase, with many reporting that their inquiries were not promptly

addressed. The open-ended responses revealed that junior employees found it challenging to integrate their traditional knowledge with the new system and link it to their KPIs.

The survey findings presented in this chapter reveal the respondents' suggestions for improving the ERP implementation process in the organisation. The respondents suggested that piloting the program with one branch and having systems champions could have helped create mentors and bridge the system solutions effectively at the branches. They also recommended that the traditional and new systems should run concurrently to allow employees to adapt before fully implementing the new system. The survey data also indicated that respondents felt that the vendor did not understand the flow of products, which led to confusion and affected the expected outcomes.

This chapter provided the results from the quantitative part of the study. In the next chapter, the qualitative findings and analysis will be presented.



CHAPTER FIVE: QUALITATIVE STUDY FINDINGS AND ANALYSIS

5.1 Introduction

The previous chapter focused on the presentation of data collected through the quantitative strand of the study. This chapter provides an analysis of the interview data collected, as discussed in Chapter Three. The participants gave their consent for the interviews to be audio-recorded, and the transcripts were analysed using NVivo 12 qualitative analysis software. The analysis was complemented by discussions with the participants to improve contextual understanding of the results and allow for further engagement. Thematic analysis was employed to analyse the data.

5.2 Response rate

Out of the population of 24 selected for qualitative data collection, data saturation was reached after the 14th participant, resulting in a 50% response rate. According to Yin (2015), reaching saturation after interviewing 12 participants is acceptable, especially for studies aiming to understand commonalities within a homogenous group. Saunders et al. (2018) further suggest that researchers should continue collecting qualitative data until data saturation is reached. In this study, the researcher conducted 14 semi-structured one-on-one interviews and concluded that data saturation was reached after 12 interviews. However, questioning continued until the adequacy of the information obtained was verified.

The invitation to participate in the semi-structured interviews was accompanied by an invitation letter, the research project's purpose, and consent allowing the invitee to notify the researcher if they wished to participate. The invitation letter stated the risks and the researchers' identities. The invitations were sent by email, and the sample was obtained from the CEO and executive director of the communications department of the organisation, as discussed in Chapter Three. A total of 14 valid interviews (N=14) were conducted over six weeks in rounds, each week with

participants at the same employment level. Once these interviews were transcribed and analysed, data patterns emerged, indicating a saturation point had been reached, and no additional information could be obtained from the participants.

To confirm the findings, the researcher conducted a second round of four interviews, including one more director, a senior manager, a specialist, and a regional manager, before ending the qualitative data collection process. All participants were interviewed via MS Teams to comply with COVID-19 restrictions, and no participants were interviewed face-to-face.

All positions were represented among the 14 participants, and demographic data in terms of occupation and cumulative years of experience are provided in Table 5.1, as data saturation was reached as discussed in Chapter Three.

Table 5.1: Participants' demographic data

Participant's Occupation	*Code Assigned*	*Number of Participants*	*Combined Years of Employment*
Executive Directors	ED_1; ED_2	2	7
Senior Managers	SM_1; SM_2; SM_3; SM_4	4	11
Specialists	SS_1; SS_2; SS_3; SS_4; SS_5;	5	13
Regional Managers	RM_1; RM_2; RM_3;	3	10
TOTAL		**14**	**41**

Table 5.1 presents the occupation of the 14 participants involved in the qualitative data collection stage. The sample included two (2) executive directors, representing

40% of the total population of the organisation's executive directors. Four (4) senior managers, representing the total population of five (5) specialists, and three (3) out of seven regional managers. In total, the participants had a cumulative experience of 41 years during the ERP project implementation. The researcher deemed this sample size to be rich and sufficient for the research study and a good representation of the targeted population.

5.3 Identification of themes

In this qualitative study, the aim was to investigate the relationship between knowledge management and ERP implementation in a public sector organisation. Mediating factors that can facilitate the implementation of the ERP system using knowledge management were explored, and several themes emerged. Firstly (a), it was found that top management support, knowledge sharing, and business process re-engineering were crucial for successful implementation. Secondly (b), end-user training to embrace change management was identified as a key factor. Thirdly (c), user involvement was important to improve morale. Fourthly (d), communication was found to be essential. Fifthly (e), strategic alignment and data accuracy were identified as necessary for effective knowledge transfer. Lastly (f), post-implementation performance monitoring of the ERP was recommended to improve organisational performance. These themes provide important insights for public sector organisations to consider when implementing ERP systems. Further research can build on these findings and explore the practical implications of these themes in greater detail.

a) Theme 1: Top management support, knowledge sharing, and business process re-engineering

Top management support refers to the assistance that managers should provide to their subordinates to enable them to adapt easily to the new system at an initial stage until they can use the system independently (Wibowo & Sari, 2018). On the other hand, BPR is an approach to achieving radical improvement in various performance metrics through the introduction of processes or technologically innovative ways of doing business (Awolusi & Atiku, 2019). The study participants were supportive of

this strategy and had positive views about the implementation of the ERP system in the organisation. The participants believed that management has a responsibility to motivate users to effectively use the new system, and management itself should constantly review business processes to fit the new system, so their subordinates could find it easy to use the system. The frequency of the theme of top management support is presented in Table 5.2, which shows the interview responses of nine participants on top management support for the successful implementation of ERP systems.

Table 5.2: Frequency for top management support and knowledge sharing and BPR

Source	Number of responses
ED	1
SM	3
SS	2
RM	3
TOTAL	**9**

According to Table 5.2, in the qualitative study, three senior managers, an executive director, two specialists, and three regional managers emphasised the importance of top management support in the full implementation of the ERP system in the organisation. They stressed that top management should provide assurance that the new system will work and is necessary for the organisation. Two regional managers, an executive director, and a senior manager highlighted the need for top management backing throughout the ERP system implementation process to ensure real-time resolution of challenges faced and successful adoption leading to re-innovation of business processes. All specialists agreed that top management should be involved in strategic decision-making for the successful implementation of modern technologies that take the organisation to an advanced stage.

ED_1: stated, "*I took time learning the system and making sure I work close to the vendor to follow up on the project at every stage, pushing forward on every task. I was in the committee meeting that selected our ERP provider; we approved all business processes drawn by our department management ensuring that they are in line with our products and services*". **ED_1** further said, "*I had ensured that some tasks are reassigned to some subordinates to make sure that the tasks on the system are aligned to the processes of every product". **ED_1*** emphasised the necessity of top management support to successfully implement the ERP was necessary by saying, *"I think it is crucial to have top management overlooking each aspect of the ERP implementation stage to ensure success in this project*".

SM_1 strongly recommended the proper allocation of resources needed for the ERP implementation and having an external opinion to put such a project on track. **SM_2** stated, *"I supported this project by providing the vendor with all the information and time needed as well as the recommendation of the outsourcing of a business analyst to assess from the initial stage of the project is correctly aligned to the organisation services to make the vendor's work easier after implementation".* **SM_3** said, "*I provided the needed financial resources such as setting up the needed budget and timeously reviewing the project plan and had always been aligning the ERP implementation with our company's strategies and automation process".*

RM_1 said, "*the top management has a role of providing the correct information to the end-users of the system to combat the resistance to change from employees during the transition to the new system".* **RM_1** stated, *"Constant training, communication, transition processes, follow-ups and support are mandatory roles of top management for employees to easily adopt the new system".*

RM_2 engaged in all implementation phases. **RM_2** stated, *"With the experience I have and having been employed in this organisation for seven years, I know all our operations, so I was capable to write a brief description of our requirements for the products to be aligned to the tasks of every employee".* **RM_2** further said: "*I communicated the importance of the implementation to the subordinate employees and reduced some tasks for senior managers so they could focus on the ERP implementation and spend the needed time on monitoring and evaluating every*

implemented task to the system with the users and making sure they are adopting the system correctly". **RM_3** said, *"End-users' attitude toward the new system was to determine their adoption or denial. The main task of the top management was to motivate and push their decision to adopt".*

SS_1, on the other hand, said that support from the top management and information sharing in successfully implementing ERP is important. **SS_1** stated, "*We must all as the employees of the organisation understand that the implementation of an ERP system will change the way people work. The top management has the mandate to support the implementation and explain the reasons for implementation and how the company and employees will benefit as well as assuring them that their jobs are safe".* **SS_2** added that "*The migration of information from the traditional system and how well the organisation can adapt to the business model. Therefore, top management support is vital for project schedule and plans".* **SS_2** concluded that without the top management support, the ERP implementation will not bear any fruits, and without the involvement of the top management in the planning of the project, software selection, and approving project milestones, there will be no success in ERP implementation.

The findings of this study, under this theme, are consistent with previous research, as discussed below. Kemei et al. (2018) explained that the top management of an organisation serves as a crucial link between employees and the adoption of ERP systems. Hwang (2019) suggested that top management should ensure that the system adopted by the organisation adds value. Top managers are responsible for strategising the processes of an organisation to fit the IT system being adopted, supporting both the vendor and end-users of the system by providing the necessary resources and ensuring that subordinates are comfortable with adopting the system (Mahmood et al., 2019). In addition, top managers play a role in implementing digital transformation from traditional systems used by the organisation (Haleem et al., 2020). Yusuff et al. (2019) argued that both the vendor and subordinates are motivated to successfully implement and use ERP systems by the top management of the organisation.

Based on the above analysis, it can be concluded that top management in organisations implementing IT innovation systems has a responsibility to positively influence individuals to use the newly adopted system by constantly communicating the innovation and its benefits, involving employees in the process, and providing training to users (Jiwasiddi & Mondong, 2018).

b) Theme 2: End-user training to embrace change management

The implementation of an ERP system is a challenging task for organisations, as evidenced in the literature. To ensure successful implementation, organisations must have a clear and systematic plan, expert advice, and a well-structured methodology. This is especially true for large multi-departmental organisations such as NYDA, where implementing an ERP system can take years to become fully functional. It is therefore important to provide employees with in-depth training and assistance with changes in staff and company workflows, which may introduce additional challenges and restrictions to their daily operations.

Employees must understand their roles and responsibilities in implementing and using ERP systems, making training a critical component of successful implementation. Specifically, it is important to understand how data flows through the system, what is expected of them, and how they differ from their traditional roles (Noudoostbeni et al., 2009). Before receiving ERP system-specific training, employees should be briefed on company-wide processes and specific departmental work routines. This business process introduction should give a sense of the importance of the project, integrated with the business process and her ERP system-specific training, and should address learning outcomes related to cognitive, emotional, and metacognitive goals (Mahmood et al., 2019).

Training should be tailored to the tasks and routines of each department within the organisation. Table 5.3 shows the frequency of the theme of ERP implementation training needs, indicating the importance of training for the successful implementation of ERP systems.

Table 5.3: Frequency of end-user training to embrace change management

Source	Number of responses
ED	2
SM	3
SS	4
RM	2
TOTAL	**11**

Based on the responses from the participants, it was found that ERP implementation training was crucial for ensuring that employees become familiar with the new system and understand the associated processes and routines. The importance of training was particularly emphasised by three senior managers, two executive directors, four specialists, and two regional managers. These participants recognised that effective training is essential at all stages of the implementation process to ensure successful adoption of the system by staff members.

ED_1 said, "*We are aware that user training has a huge positive impact on the implementation since users oversee operating the system when it goes live, and users are responsible for the organisation's outputs".* **ED_2** said, *"Regrettably, user training was found to be inadequate and overwhelming from the beginning of the project up to this day*". **ED_2** continued by saying *"Subordinates felt that training didn't focus on their specific key performance indicators and specific jobs which affected the users' overall system knowledge and the operations technicalities of each product".*

The following statement was made by **SS_1** to explain how training was conducted: "*The training was incorrectly positioned as it was pre-recorded. Everything seemed simple and easy in the video, but it became a different story when we got to the*

point of using the system ourselves". **SS_2** said, *"We spent so much time getting to know the system theoretically while it was not up and running to assess if the processes are well aligned".* **SS_3** and **SS_4** both agreed on saying, *"I think we should have spent more time getting to know the processes we use to process each product and concentrate on modifying that instead of learning more theoretical parts of the system".* Participants considered successful implementation impossible without a good ERP team and training or a vendor that knows the whole organisation's processes. The findings under this theme resonate with the study of Obwegeser et al. (2019) on implementation, testing, and monitoring of the system until it is well-polished and ready to work.

RM_1 said, "*Enough training should have been given to all the employees earlier".* **RM_1** continued to say, *"Organisation has experienced the struggle with the system take-off because of the lack of the proper training".* **RM_2** said, *"The inference here is that had ERP training begun earlier, more time could be spent practising, or there might be time for one-on-one sessions with people who struggled with using the system to accomplish their daily tasks*". All these statements sound logical, but there are two mistakes here:

a) The earlier the training relative to the ERP implementation date, the lower the retention rate.
b) In NYDA's case, the vendor did not have sufficient master data and test configurations in place to make his ERP training viable long before going live.

SM_1 said, *"I told the ERP instructor who was training me online that I didn't understand, but he just kept going".* Unfortunately, for NYDA, the online pre-recorded ERP pieces of training were conducted and as such, it had to be paced to avoid the point of diminishing returns. **SM_2** said, *"The hard fact is, some people aren't going to understand ERP with the online training and may need the face-to-face instruction and practical training to understand while doing it".* The instructor is responsible for being as clear as possible, walking the user through the process step by step, answering all questions, and being as accurate and patient as possible. One must move on to do the rest of the course. That is where the necessity for user

champions arises. The champions are then trained on a "train-a-trainer" more precise training. **SM_3** and **SM_4** said, *"There is the time a need for a supervisor who can assess whether one-on-one training can resolve the problem, or whether users should be reassigned in training tasks. By this, the implementor can just focus on the implementation side while the supervisor trains the user champions".*

The participants of the study emphasised the importance of providing ERP training to all employees of the organisation to ensure successful integration of ERP into their daily work and to enable them to use it for all interactions within the organisation. Research studies have suggested that providing ERP training to employees can improve their productivity and efficiency (Carbine et al., 2021; Motahar et al., 2018). Through ERP training, employees can understand how to operate the system effectively and complete tasks in a shorter period, thus reducing the time wasted in trying to figure out if the ERP system works (Carbine et al., 2021). Consistency in performing specific tasks across the organisation is ensured through providing thorough training to all employees, which in turn reduces the chance of human error and ensures that all employees have a clear understanding of the system (Mahmood et al., 2019).

c) Theme 3: Frequency of user involvement to improve staff morale

User involvement is a crucial success strategy that the implementing vendor should consider to ensure that employees understand their key performance indicators in the system and how to integrate traditional business processes into the new system without losing any step in product delivery (Leso et al., 2022). All the participants in the interviews mentioned user involvement as an effective strategy and recommended it as a critical success factor for implementing the ERP system in the organisation. Table 5.4 shows the frequency of user involvement and participants' responses, with a total of 14 responses.

Table 5.4: Frequency of end-user involvement to improve staff morale

Source	Number of responses
ED	2
SM	4
SS	5
RM	3
TOTAL	**14**

ED_1 stated that it is important for the employees to be involved in the information collection process because they are the people who will be utilising the system. **ED_1** said, *"I had asked all the regional managers to involve the subordinates in the process of collecting requirements while setting up the ERP and what the process flow will look like"*. **ED_1** continued and said, *"the employees should be given a chance to elaborate on their tasks and how they wish to apply them to a system"*. **ED_2** explained, *"The regional managers should be the user champions and have a task to continuously communicate the updates to their subordinates and demonstrate to them how to use the system"*.

RM_1 noted, *"The employees on the ground are the ones who use the system, and the implementation starts with them, they see all the glitches and are the monitors that help fix where the system is not doing well"*. **RM_1** further said, *"Junior employees are perfect to collect requirements and draw the business processes on the system as they use it in their day-in-day-out performances of business processes"*. **RM_2** said, *"These people know the current processes inside and out and can draw the perfect route the system should take to deliver the organisation's products"*. **RM_3** said, *"Employees should be the first to receive training on the new system and the end-product for them to see if it meets the requirements it is meant for, in that way their morale is positively influenced"*. **RM_4** continued by saying, *"Assigning the end-users to the first training class is important for the evaluation of the system"*. **RM_4** explained, *"The involvement of the users helps to configure the workflows in the system and evaluate the system on different department processes through different demonstrations with the employees to train*

them on how to use each process and train them on how to carry their tasks and responsibilities on the system".

SM_1 emphasised the importance of involving the users, stating, *"All the process requirements from all the products and how they integrate is the information that can only be sourced from the employees on the ground".* Also, **SM_1** said the involvement of users from the initial stage of the ERP implementation and training them by holding divisional meetings to review the steps and processes that had been already loaded on the ERP and to discuss if they fit into the organisation's needs. **SM_2** stated, *"I believe that the first-hand training where the users used the system and give feedback was a necessity for the ERP implementation process".* **SM_2** continued, *"This should allow the end-users to recommend some changes to make it easier for users to use the system".*

SM_3 narrated the involvement of users, highlighting, *"It is important to depend on the support of employees during ERP implementation as this in return could improve their morale and remove a resistance to change".* **SM_3,** *"End-users must be involved in the process to understand the need for change, ours as their managers are to always avail ourselves to them to address their queries and challenges".* **SM_4** explained, *"The perception of end-users toward the ERP system is a critical success factor for adoption and getting them first-hand in the organisation's changes".* **SM_4** further narrated, *"End-users' attitude towards the new system determines adoption or denial towards the adoption. If they decided to adopt the system, the system will be implemented and easier for them to use".* **SM_4** said, *"The system needed to be piloted at least by one office to determine if it does what it is meant to do".*

SS_1 stated, *"By testing, the end-users can experience the system in a limited area. Therefore, it was important to evaluate the system and understand its functions".* **SS_2** talked about the advantages the system brings to the organisation, stating, *"The managers used the method of comparing and contrasting showing end-users the benefits and advantages of the system compared to using spreadsheets to explain the decision of migrating to the new system".* **SS_2** further noted: *"They showed the users who will be performing their tasks in less time and have better*

tools for data extractions from the cloud network uninterrupted". **SS_3** was able to reduce resistance through training and said, *"During the training, the end-users were demonstrated to that using the system to do their job better than using the traditional methods".* Finally, **SS_4** talked about the strategy to involve the end-users: *"The focus should be on constantly communicating the strategy of the organisation and the benefits of the new system, involving employees with the products delivery processes should be the main focus, allowing the employees to evaluate the system before going live".* **SS_4** insisted that end-users should be involved in the process of the data migration phase from the traditional system and review if the data is correct and confirm that it is best aligned to their duties, and confirm if the system is easy to use.

The study results indicate that the vendor did not fully involve users in the ERP implementation project, which should have been done throughout the process. The pre-recorded training sessions provided to end-users did not allow them to ask questions about why certain steps of the process were skipped in the ERP system compared to the traditional system. To ensure a successful ERP implementation, it is important to involve all users in the process requirements collections for all product deliverables and review data migration with the users. Increasing user involvement in implementing organisational programmes enhances staff morale and reduces resistance to change. Finally, end-users' feedback on how to make the system easier and aligned with all their tasks is essential for evaluating the system. The participants' responses confirmed the findings from previous literature. Bhattacharya et al. (2019) discussed the importance of end-user involvement from the adoption of the system as they are the implementers of the programmes of the organisation. During the ERP implementation phase, managers should involve users to confirm and merge the correct implementation of the current business processes in the ERP system (Bogonko & Ogalo, 2019).

An organisation may have to change its business processes from what the traditional system used to do and use the new processes of ERP (Bogonko & Ogalo, 2019). The user involvement process could improve staff morale while ensuring the correct match of user responsibilities in each product (Menon, 2019). This theme is

consistent with Stone and Zhang's (2021) attributes of relative advantage regarding staff morale.

When managers commit to communicating the advantages of the new system and explain their roles in detail, and ensure job security for employees, it reduces resistance to change by the users (Rista, 2021). Research indicates that end-users who engage in the decision-making and initial stages of the system take-off are more likely to accept the system (Bhattacharya et al., 2019; Mohammadi et al., 2017). Bhattacharya et al. (2019) proposed that the ERP implementation strategy of user involvement improves staff morale and enhances a sense of ownership toward a successful ERP implementation for employees and ensures their responsibilities in the new system. Organisations should consider establishing data-driven measurement procedures to monitor process performance, which will help monitor the success of the ERP implementation (Westgard & Westgard, 2017).

d) Theme 4: Communication and knowledge transfer

Based on the responses to the study, it is evident that the management of an organisation should prioritise the relationship between employees, processes, and systems to ensure successful implementation of changes (Gunjal & Gogte, 2019). The effective use of change management has been identified as a critical success factor in the implementation of ERP systems in the organisation. Table 5.5 presents nine references related to change management for the successful implementation of ERP systems.

Table 5.5: Frequency of communication and knowledge transfer

Source	Number of responses
ED	2
SM	2
SS	2
RM	3
TOTAL	**9**

ED_1 explained that understanding the ERP as a cloud platform and what it brings to the organisation was a challenge during the implementation phase: *"Another challenge is understanding the ERP itself as a cloud platform. Employees were uncertain about their jobs, we were worried about data security, performance measurements, and control of work processes".* **ED_2** said the traditional filing system had been kept in the organisation as a backup system while working on a cloud system, as they were scared that they might lose data: *"The service provider securely stored all our data before starting the implementation, and backups were then scheduled for our backups of all our data on an offline disk".*

RM_1 said, *"We had to learn how the updates of the cloud system work with the help of the ERP vendor and learn the integration of products"*. **RM_1** continued, *"What gave us a piece of mind is that the provider had full control over the software part which suited us none of our IT staff members are ERP specialists and could not work on fixes or updates concerning the ERP".* Moreover, **RM_2** said change management was used to transact into the ERP from the traditional system: *"Another challenge was the significant changes that the software brought into our organisation's conventional business model and the day-to-day business practices for the staff members that we have been using over the years".* **RM_2** noted the business funding process that is being used: *"We actually re-engineered our funding process by simplifying the flow of uploading all the required documents online, let the system scan if those are the correct documents, schedule telephonically assessment and site inspection and send approvals on applications to the applicants".* **RM_3** explained, *"Our business processes per product delivery were reviewed and enhanced by reducing repetitive work through ERP integration while still maintaining everyone's position".* **RM_3** further said, *"We developed a change management strategy to tackle the integration obstacle knowing that the users of the system are humans who were used to processes being one way and will more likely find it hard to switch to a new way of doing things, especially if the benefit of the new methods is not immediately obvious".*

SM_1 said constant communication helps ease the transition challenges to the ERP and lets employees foresee the advantage of having all the products stored in one

cloud. **SM_1** noted, *"With the pre-recorded training, we have noted most of the questioned that arrived and therefore issued policies to help users understand the importance of using the system".* **SM_1** continues, *"The implementation of the change management strategy by changing business operations to achieve a seamless transition to the new system has helped enhance the willingness of the staff members to accept this change and embrace it".* **SM_2** explained, *"We told employees at the beginning of the ERP implementation not to use e-mails to communicate regarding work, all the information the employee needs should be in the system on a cloud network".* **SM_2** further noted, *"We then had decided to remove the telephones from the desks of the production team so they could check the system to know what they will do next without the disturbance".* **SM_2** concluded, *"We had to ask the vendor to have their system helpdesk installed in the system and adjust some of our processes to completely have our processes automated on the system as we believe that the adjustments made improved our processes".*

SS_1 explained, *"The decision that the organisation took to implement ERP was expected to bring change in working conditions, operating procedures, reporting structure, resource management, and many operations-related activities and make everything easier and system-based".* **SS_1** noted the importance of end-users involved in the implementors of the programme was important, exercising the bottom-up approach of system implementation to adopt the changes was going to be the best approach: *"It is important to depend on the support of employees who are the programme implementors on the ground during ERP implementation. They must be involved in the process to understand the need for change and all the changes it comes within the product delivery processes, and leaders must always be available to address their queries and challenges".* **SS_1** continues to state, *"The perception of employees toward adopting and using the new ERP system is an important aspect and should always be observed by the managers".* **SS_2** explained, *"The role of top management is to provide the necessary resources for employees to easily adopt the new system from a constant communication, training, changing processes, and continuous follow-up and support, and the availability of the helpdesk at all times".* **SS_2** explained the importance of the system in

increasing user adoption rate: *"The process following demonstrating video was sent to them showing the advantage of using the new system in terms of ease of use helped as less time was taken to complete the task"*. **SS_2** explained the satisfaction and ease of use and further said, *"The organisation wanted all the users to be satisfied doing their tasks on the system by making sure that the system matches the activities of the user".* Finally, **SS_2** said, *"The helpdesk availability helped the vendor address all the challenges the user had and helped solve them with the product-specific training and daily follow-up from top management to make sure that any issue the employees raise concerning the software is solved or managed directly".*

The study participants confirmed the importance of change management, which aligns with previous literature. Kiran and Reddy (2019) define change management as the process of improving organisational operations to achieve better results. When implementing a new ERP system, it is essential to align it with traditional business processes and ensure that all employees can easily adapt to the system with minimal modifications (Gupta et al., 2018). Prioritising employee readiness through effective training is crucial in the change management strategy (Mahmood et al., 2019). Organisational leaders implementing the ERP system should prioritise constant communication with employees to prepare them for the change and discuss the benefits and details of the change to help them adapt to the new routine in their daily operations (Gunjal & Gogte, 2019). Effective communication also helps to reduce the risk of user resistance to the migration process (Gunjal & Gogte, 2019).

e) Theme 5: ERP organisation strategic alignment and data accuracy for knowledge transfer

Ensuring data accuracy is a critical component of information quality when implementing ERP in an organisation, as it enables the reporting of correct information from the system suitability system quality from a customer's point of view (Tarigan & Basana, 2019). Inaccurate data entry can have far-reaching implications, affecting all modules and products and resulting in significant financial losses for the organisation. Therefore, the system's ability to control and provide accurate data is crucial during ERP implementation.

Aligning the ERP system with the organisation's products and processes is a proven success factor for most companies. This alignment necessitates a thorough analysis of business processes and procedures, a customised ERP system, and full vendor support. Customisation of the ERP system should align with the organisational processes, which is critical to its successful use after the go-live stage. Strategic alignment requires that the ERP implementation matches and advances the organisation's business strategies and goals (Chatti et al., 2021). Table 5.6 displays the frequency of strategic alignment and data accuracy, with 10 participant interview responses recorded.

Table 5.6: Frequency of ERP organisation strategic alignment and data accuracy for knowledge transfer

Source	Number of responses
ED	2
SM	3
SS	3
RM	2
TOTAL	**10**

ED_1 revealed, *"Because ERP provides a holistic view of the customer with all their specific needs & requirements and history of all interactions with the customers over a period, the vendor has to align it to the strategy of the organisation"*. **ED_1** continued saying, *"The strategically aligned ERP with the correct information migrated from the traditional system it has become easier manage and streamline so many responsibilities"*. **ED_1** discussed further and said, *"Access to vital information has been easier with data stored in the cloud network and user-friendly interfaces make work smoother"*. **ED_2** explained, *"Employees can now easily acquire information whenever they want without having to contact a person with a physical file to make their jobs easier"*. **ED_2** continued, *"Acquiring standard reports or creating one for an upcoming presentation, the aligned ERP with an accurate information have managed to save quite some time that helps employees focus on their actual jobs instead"*.

RM_1, on the other hand, said, *"Worker's productivity has increased massively since the implementation of the strategically aligned ERP resulting in faster client service"*. **RM_1** was happy to say, since the implementation of the ERP, they as managers have had extra time to focus on other tasks and had positive management results. **RM_2** said, *"The primary goal of an organisation to have a customised ERP system was to integrate and align various enterprise responsibilities into a proper unified platform where the traditional platforms are correctly migrated"*. **RM_2** continued, *"The management had decided to migrate to the ERP system to marginalize the business growth and faster service delivery"*. The organisation needs to migrate the correct data from the traditional source to the ERP system, where it is strategically aligned to the business processes to avoid employees being left behind sorting information stored in multiple systems and locations. **RM_2** lastly said, *"We have realised that having a centralisation of information results in proper streamlining of duties which ultimately leads to improved efficiency of employees"*.

SS_1 said, *"The integration of multiple processes into a single database which can be accessed simultaneously had concluded to us that the ERP was well implemented"*. **SS_1** continued to say, *"The streamlining of the various management processes has allowed shared databases through ERP system. Employees are now able to perform various functions quickly and accurately with the access of information on the cloud"*. **SS_2** agreed by saying, *"The integrity and proper data security are essential and with the ERP, records of who accesses information are stored and only the employees with credentials have access to information"*. **SS_2** indicated, *"The NYDA is now able to offer clients a tailor-made concrete business solution where every product they apply for is online and can track their application at any time. This enables transparency and system efficiency"*. **SS_3** added, *"A significant problem that the organisation had long been experiencing is working with a non-integrated information management system where data was redundant"*. **SS_3** ended by saying, *"Pieces of information were usually generated twice or more in different departments on the traditional system, creating more confusion and inconsistency due to multiple information*

storage platforms. ERP was able to rectify all this by aligning its functions to the strategic decisions".

SM_1 said, *"ERP allowed the organisation to study its client's needs and restructure its products and services according to those needs, focus on continuously improving products and services based on their specific requirements to the products they have applied for, provide personalised advice that will add value to them".* **SM_1** continued, *"Although the ERP was tailor-made to fulfil the requirements of our organisation as much as possible, there are still gaps and alterations that are needed to perfectly fit the organisation requirements".* **SM_2** said, *"There is still some misalignment and mismatch of some products and processes because an organisation could not seamlessly combine its business requirements with the provided embedded structure of the ERP software".* **SM_2** highlighted, *"We do not foresee and failure into the system take-off because these miner misalignments are being addressed".* Lastly, **SM_3** said, *"Data migration errors occurred due minimum communication and user involvement during migration, leading to an inaccurate data reflection on the ERP solution".* **SS_3** ended by saying, *"The data errors were only picked up after the 'Go-Live' date which delayed the system usage various products".*

The participants of the study agreed with the findings of previous studies that emphasised the importance of ERP systems in the strategic structure of organisations and the need to migrate accurate data from traditional systems. When implementing ERP, organisations face two types of alignment: strategic alignment and organisational alignment (Govindaraju et al., 2018). Strategic alignment requires the vendor to align the ERP with organisational goals, business strategy, organisational change management, and process improvement (Velcu, 2010). The ERP system should integrate all business processes and organisational structures into the new business model (Huang & Yokota, 2018). Misalignment occurs when certain functions in the system are not related to the organisation's business processes (Tasanen, 2018). Therefore, ERP implementation should integrate each process of the organisation's function (Tasanen, 2018).

f) Theme 6: ERP post-implementation performance monitoring to improve organisation performance

In order to ensure successful organisational performance, it is crucial for organisations to conduct post-implementation performance monitoring of their ERP system on an immediate and continuous basis. This monitoring is intended to evaluate the system's effectiveness in achieving its intended goals and to identify areas for improvement. Table 5.7 provides a summary of the frequency of post-implementation performance monitoring responses obtained from eight interview participants.

Table 5.7: Frequency of ERP post-implementation performance monitoring to improve organisation performance

Source	Number of responses
ED	2
SM	1
SS	2
RM	3
TOTAL	**8**

RM_1 noted, *"There is no system that can just be implemented without a tool to measure and monitor its performance for a continuous business process improvement purpose".* **RM_1** lastly said, *"The organisation's decision to adopt the ERP system was to enhance the performance of current processes on overall products and services, we have to monitor if this is fulfilled".* **RM_2** explained, *"We configured our products processes on the system, and we now have to monitor them in detail if the workflow and processes are performed perfectly".* **RM_2** proceeded to say, *"... and accordingly, we have started making changes to perfect it by reducing work and data entry that was not necessary for the final output".* **RM_2** further noted, *"There is a dashboard that the ERP solution provides which allows for proper decision-making for the users and the performance indicators calculated by the system, it activates improvements in different processes".*

RM_1 commented, *"We have monthly meetings with the vendor to reflect on the system pros and cons, this helps deal with the glitches early and find solutions, this has helped improve and optimise our processes"*. **RM_1** said, *"All the divisions of the organisation can now work together seamlessly on a well-integrated system, information is instantly shared with the vendor and delays are avoided"*. **RM_2** stated, *"The continuous performance monitoring through the monthly meetings, has provided the management with data to update the business strategy and guidance to update the business strategy to enhance overall organisation performance and improve performance"*. **RM_2** further said, *"The system dashboard has given a platform for users to have instant information feedback and allows identification of strengths and weaknesses and places of improvement"*. **RM_3** further discussed how the growth in performance has grown in a brief period post-ERP implementation. **RM_3** stated, *"We have improved the delivery and shortened the feedback time to our clients, we are now able to see the repeat applicants by an identity number and the tracking capabilities of the system which enables us to retrieve history"*. **RM_3** ended by saying, *"We are now able to better manage our team performance on a monthly basis and see if the HR intervention is needed"*.

Also, **SM_1** commented, *"The process of product delivery is now streamlined, everyone knows what to do based on the workflow, on top of that, the system reminds you about the tasks that need you by flicking … Late reports and mismatch on numbers are the things of the past as all products are monitored the same time they are being performed … Managers can now directly focus on improving and modifying the products and services instead of micro-managing individuals"*.

Finally, **SS_1** concluded, *"In just a brief period post-implementation, we were able to reduce redundancy and a backlog, increase the pace of service delivery, and increase client satisfaction with instant feedback and a live tracker on products and services"*. **SS_1** was excited about the reports and said, *"Reports were generated manually on certain days of the month, and department heads were spending more than a week physically counting all those numbers, with the ERP, numbers are counted instantly, and decision-making information is in the hands of the*

managers". **SS_2** explained how they were able to improve the response rate to clients: *"The system can respond instantly to our clients because of ERP automation*". **SS_2** further commented, *"The system can now integrate the client with at least four products at the same time without having to open a different file".*

The study participants affirmed the importance of aligning the operational resources of the organisation with the strategic plan to ensure smooth performance after ERP implementation, which was consistent with previous studies (Ghazaleh et al., 2019). Continuous monitoring of the newly implemented ERP system is necessary to identify any gaps in the organisation's processes (Hasan et al., 2019). Standardisation of processes across all offices of the organisation is also critical to measure performance (Lin et al., 2021). Successful ERP implementation can reduce operational costs by monitoring the performance of each process (Maas et al., 2018). Li et al. (2020) highlighted that ERP implementation can enhance organisational practices and minimise product and service delivery delays. A successful ERP implementation can provide a competitive advantage to the organisation in decision-making processes and planning (Hietala, 2020).

5.4 Conceptual framework review

The themes of this study were derived from the conceptual framework which relates to the correlation between knowledge management, staff morale, business process re-engineering, knowledge transfer, change management, and organisational performance improvement with regard to the successful implementation of the ERP system.

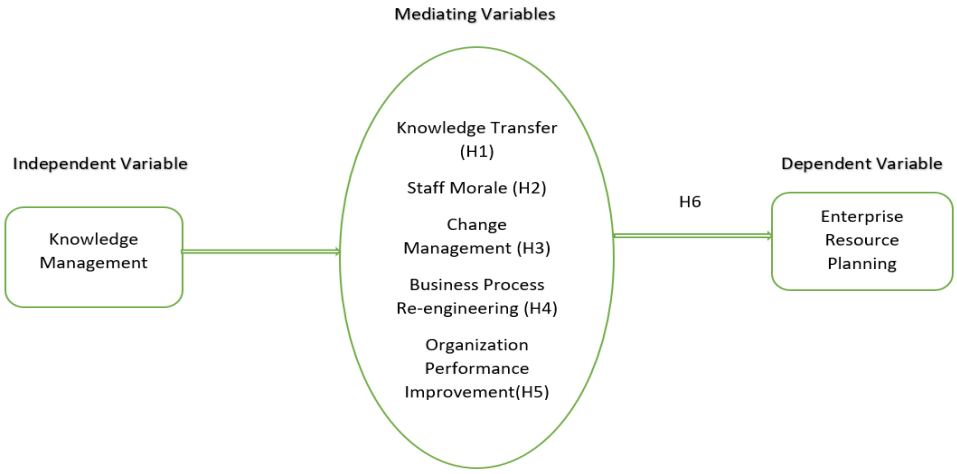


Figure 5.1: Conceptual framework of the study

The first anticipated theme pertains to the importance of top management support and knowledge sharing, which can greatly impact the successful implementation of the ERP in the organisation. The second anticipated theme relates to end-user training aimed at promoting change management, which can also significantly impact the success of ERP implementation. The third anticipated theme highlights user involvement during the ERP implementation process to improve staff morale. The fourth anticipated theme underscores the significance of effective communication and knowledge transfer for successful ERP implementation. The fifth anticipated theme focuses on ERP organisation strategic alignment and data accuracy, which facilitate knowledge transfer and help ensure successful ERP implementation. Finally, the sixth anticipated theme involves post-implementation performance monitoring to improve organisation performance.

The interview responses confirm the importance of all these themes in facilitating successful ERP implementation. Therefore, it is crucial for management to ensure that all these themes are given proper attention and adhered to during the ERP implementation process.

The theme of top management support and knowledge sharing is consistent with Jayeola et al. (2020), who posit that the involvement of top management in ERP

implementation positively affects implementation success, particularly if they are willing to share knowledge to improve organisational performance. Given that ERP implementation leads to changes in the organisation, senior management involvement is necessary to resolve conflicts. Without a commitment from senior management, ERP implementation is at a high risk of failure. All participants emphasised the importance of knowledge sharing in the processes following the implementation of the ERP solution.

Wijaya et al. (2018) discussed the importance of end-user training in embracing change management. The study's second theme, end-user training, was found to be a necessary attribute of ERP implementation, enabling employees to adapt to the changes that come with the system. Gill, Amin, et al. (2020) confirmed that end-user training has a positive impact on the adoption of ERP. Participants noted that training users was critical to facilitating their acceptance of the system and enabling them to transact with ease by the go-live date. Nguyen and Doan (2020) identified the challenge of ERP implementation caused by differences in the package's functionality and the vendor's requirements, leading to barriers and decreased organisational performance.

Regarding the third theme of user involvement during the ERP implementation to improve staff morale, the study participants had a positive response regarding this theme's association with successful ERP implementation. Stone and Zhang (2021) suggested that for an organisation to achieve successful ERP implementation, it is crucial to involve end-users. While top management is responsible for steering the implementation, end-users are the key drivers. The involvement of end-users, who implement the program, ensures that business processes driven by the new ERP align with the organisation's needs (Chatzoglou et al., 2016). Additionally, Vincent and Premkumar (2021) found that involving users improves communication with the developers, leading to a better understanding of organisational needs and increased user satisfaction.

In relation to the anticipated theme of communication and knowledge transfer, the study participants agreed that regular communication is vital for successful ERP implementation. Effective communication channels ensure that suppliers are kept

updated, and employees are informed of the project's status. Given that ERP is a system that spans across the company and involves cross-functional teams, effective communication and coordination among different departments are critical (Samiei & Habibi, 2020). Effective communication has a positive impact on implementation success, significantly influences system acceptance, and helps to reduce resistance (Vaghefi et al., 2018).

According to the study participants, strategic alignment and data accuracy are crucial factors in successfully implementing ERP in an organisation, alongside the facilitation of knowledge transfer from top management to subordinates. Data quality and validation are essential for a successful ERP implementation, as the migration of data from legacy systems to newly implemented systems must be accurate. As noted by Adjie Eryadi and Nizar Hidayanto (2020), strategic direction and leadership commitment are critical to positively impacting the effectiveness of any organisation's ERP implementation. The top management must work with the organisation's human resources to align competencies and skills, leadership vision, and willingness to change, and involve employees in planning and innovation to ensure the organisation's competitive edge. Chofreha et al. (2019) also underscored the importance of strategic alignment and leadership involvement in realising the organisational benefits of ERP IT systems. As ERP systems are highly integrated, data quality is expected to be a critical success factor for implementation.

Finally, the post-implementation performance monitoring of ERP helps decision-makers to assess the alignment of the system with the organisation's processes (Pohludka et al., 2018). Monitoring the system can improve process quality, reduce waste and prevent employee frustration. Furthermore, it ensures that customer satisfaction is prioritised.

The next chapter will provide an integrated analysis, conclusion, and recommendations based on the findings of the study.

CHAPTER SIX: INTEGRATED ANALYSIS, CONCLUSION, AND RECOMMENDATIONS

6.1 Introduction

The penultimate chapter provided an analysis of the interview data collected. This final chapter provides an analysis of the results presented in Chapters Four and Five and presents conclusions and recommendations based on the study's findings. The credibility of the findings and results from Chapters Four and Five are examined in light of the study's research objectives, as discussed in Chapter Three. The discussion of the results and findings aims to consolidate the ERP implementation success requirements for a public sector organisation.

6.2 Philosophical assumptions of the mixed method approach

This study adopted a formal concept of the mixed methods research (MMR) paradigm. In recent years, there has been a growing trend towards research philosophies that integrate research methods, despite the potential contradiction between qualitative and quantitative methods (Denzin, 2012). Some researchers argue that these methods draw upon incompatible philosophies, which makes it difficult to justify their combination in a single study (Creamer, 2018; Onwuegbuzie & Johnson, 2009). However, mixed method research is now widely accepted in social science and academic studies (Onwuegbuzie & Turner, 2007; Symonds & Gorard, 2010).

The purpose of adopting a mixed method research design was to comprehensively address the research problem through qualitative data collection and the analysis of quantitative results, while ensuring the credibility of the data (Creswell, 2009). The researcher employed a bottom-up approach, beginning with the quantitative strand, followed by a top-down approach, involving the qualitative strand, as presented in Chapters 4 and 5, respectively. This order allowed the researcher to gain a multi-dimensional view of the research topic, from the perspectives of both junior employees and senior management of the organisation. The similarities and

differences in the data provided a better understanding of the research topic, and allowed the researcher to generate new insights.

6.3 Data integration and interpretation – QUAN + QUAL

The study utilised the concurrent triangulation method, which involves analysing qualitative and quantitative data sets at the same time. The integration of the data from the two sets occurred at the end of the mixed-methods study. After the separate analysis of the QUAL and QUAN data sets, the findings were analysed from each component to determine whether they agreed with the research objectives or hypotheses, which is known as the convergence process. Additionally, the findings offered complementary information on the same issue being discussed with the results, which is known as the complementarity process, or if they appear to contradict each other (O'Cathain et al., 2010).

During the data analysis process of each research method, the mixing was conducted to determine how well the qualitative and quantitative data were integrated. The process of integrating the two research methods began using the themes identified in the qualitative data set as the benchmark to match with the findings from the quantitative data. The table below displayed comparisons of the two data sets, which showed convergence where the findings in the quantitative research portion matched and supported the themes identified in the qualitative research portion.

6.4 Legitimacy in mixed methods

To ensure the validity and reliability of a triangulation study that employs QUAL and QUAN approaches, both aspects need to be considered since inferences are made regardless of the interpretation used, whether deductive or inductive (Corrigan & Onwuegbuzie, 2020). In this study, credibility is of utmost importance, and the term "legitimation" is a suitable solution that is attractive to both QUAL and QUAN researchers (Corrigan and Onwuegbuzie, 2020). The quality of inferences in the triangulation study refers to validity-related issues within its context (Schoonenboom, 2022). Venkatesh et al. (2013) proposed four stages of

assessing the quality of meta-inferences: (1) discussing quality criteria within quantitative and qualitative research; (2) using mixed methods research terminology when discussing inference quality; (3) discussing the quality of mixed methods findings and/or meta-inferences, i.e. explanatory quality; and (4) discussing quality from a research design point of view, i.e. design quality. The quality of inferences was evaluated separately by each component of the study using criteria appropriate for its methodology, after which the researcher assessed the quality of meta-inferences in the mixed-methods study.

To assess the quality of inferences, both the design quality and interpretive rigour need to be examined simultaneously, including the quality of the inputs and the process of reaching the results they are based on, as well as the quality of the process of making conclusions and their outcomes (Corrigan and Onwuegbuzie, 2020). This study used MMR to address the research questions, utilising both QUAL (Chapter Five) and QUAN (Chapter Four) data to obtain a deep understanding of the relationship between KM and ERP implementation success and all the mediating variables associated with it.

6.5 Findings and discussion

This chapter aims to examine the key findings of the study by revisiting the research questions and objectives. The primary aim of the research was to investigate the existence of a significant relationship between knowledge management and enterprise resource planning in a public sector organisation, specifically the National Youth Development Agency. The conceptual framework presented in Chapter Three outlined the mediating factors between knowledge management and the successful implementation of ERP in the organisation. The research questions guiding the study were as follows, and the findings for each are discussed below:

Research questions and discussions:

What role can knowledge management and knowledge transfer play in supporting the implementation of an ERP system in an organisation?

The results from the mixed-methods study reveal that effective utilisation of knowledge is crucial for successful ERP implementation in a public sector organisation. The quantitative survey revealed a significant positive association between KM and ERP implementation, with a significance level of 0.000 (Table 4.18), indicating a strong relationship between the two variables. The qualitative findings from Chapter Five corroborate this result, as participants expressed the need for top management involvement and knowledge sharing to ensure successful implementation of the ERP. The importance of top management expertise in the implementation process was also emphasised by interviewees. Both methods support the idea that knowledge management activities, such as knowledge creation and sharing among organisational members, contribute positively to ERP implementation and enhance the organisation's competitiveness.

This finding aligns with Salloum et al.'s (2018) suggestion that knowledge sharing occurs when knowledge owners, who are usually the top management team, deliver knowledge to knowledge seekers, who are typically subordinates. It also supports the findings of Vajpayee and Ramachandran (2019) and Rosemann and Chan (2000), who reported that successful knowledge management leads to the construction of fully functional systems that are well understood by all employees instead of a particular group. Successful knowledge management sharing requires the combination of appropriate people and techniques that contribute to the successful implementation of the ERP system.

The successful implementation of ERP is critical for an organisation's performance. This is supported by the study's findings, which reveal a positive correlation between ERP implementation and organisational performance based on the surveys conducted. Table 4.17 displays a simple regression analysis with a significance level of 0.000. Additionally, the sixth theme of the quantitative study findings demonstrates that positive performance monitoring can improve organisational performance. The qualitative study also shows a positive association between performance management and ERP implementation, as revealed by the respondents. Korenková et al. (2019) confirm that an organisation's performance is based on successful ERP implementation. Furthermore, Bellisario and Pavlov

(2018) argue that innovation adoption is crucial for an organisation's performance in today's business environment.

How can organisations ensure there is positive staff morale during the ERP system implementation and prevent reluctance to change?

According to the quantitative findings presented in Table 4.14, a simple regression analysis indicates a significant correlation of 0.002 between staff morale and ERP implementation. These findings highlight the importance of considering staff morale during the implementation of a new system within an organisation. This is also supported by Theme 3 of the qualitative study, which found that involving users in the ERP system implementation process improved their morale. This finding aligns with Qureshi and Abdulkhalaq's (2015) recommendation that members of an organisation and key business employees should work closely with the implementation team throughout all the modules of the ERP system. Stone and Zhang (2021) also suggested that documenting business procedures and logic in the presence of both users and the implementation team can improve staff morale during the ERP implementation process. This allows users to identify the business logic while the team understands the logic for further application in the ERP modules.

In order to keep employees motivated and involved in the ERP implementation process, Bekele (2019) suggests that organisations should involve them in the process and assign them full responsibility for each module. This level of involvement not only helps employees stay motivated both financially and morally but also enables them to participate effectively with the implementation team. The commitment of top management is a significant factor in motivating assigned employees to work collaboratively with the implementation team and familiarise themselves with the new system.

How can organisations implement an ERP that is well planned to absorb the changes in the management of an organisation's operations?

The quantitative study revealed a strong correlation between the mediating factor of change management and the successful implementation of ERP, with a positive significance level of 0.035, which is below the threshold of 0.05. This is demonstrated in Table 4.15 of the simple regression analysis in support of hypothesis 3. The qualitative findings further support this, with respondents highlighting that better application of change management in the ERP implementation facilitates ease of adaptation to the system. These findings are consistent with the research of Mathar and Gaur (2020), who emphasised the importance of organisations introducing their employees to the changes that the ERP will bring. Similarly, Park (2018) stressed the significance of making employees aware of the changes in business processes that the ERP would introduce and aligning their duties to the capabilities of the ERP. Mahmood et al. (2019) also underlined the importance of synthesising the ERP with change management and business process changes following its implementation.

How is the business process re-engineering influenced by the KM during the ERP system implementation?

The results of the quantitative survey indicated that the implementation of the ERP system in an organisation has the potential to bring about changes and innovation in traditional business processes. Table 4.16 of the study showed a positive correlation between BPR and the successful implementation of the ERP, with a significance level of 0.000. The qualitative study also revealed that there is a positive relationship between management support for knowledge sharing and BPR. Table 5.2 of the first theme displays the frequency of top management support, knowledge sharing, and BPR among the participants of the study. These findings are consistent with Awolusi and Atiku's (2019) study, which highlighted the importance of top management support and information sharing in facilitating the adoption of BPR. Similarly, Fetais et al. (2022) emphasised the need for top

managers to share information with their subordinates during the ERP implementation to ease the transition into the business changes that the system brings. Al-Fawaeer et al. (2019) stated that organisations need to prepare themselves for technological transformation in business environments that systems such as ERP bring.

The study's quantitative analysis had demonstrated a significant relationship between knowledge transfer and the successful implementation of the ERP, as indicated by a strong correlation of 0.028 in the simple regression analysis presented in Table 4.13. This was further supported by the fifth theme of the qualitative findings, which highlighted the importance of strategic alignment between ERP implementation and organisational processes, as well as data accuracy for effective knowledge transfer. Respondents agreed that the organisation should ensure that knowledge is not withheld from vendors and that it aligns with the organisation's operational strategies. These findings are consistent with Cahyadi's (2019) study, which emphasised the importance of top management ensuring that the necessary knowledge is shared with vendors and aligned with the organisation's operational strategies. Furthermore, Alkhaffaf's (2018) study suggested that an organisation's knowledge transfer strategies should be aligned with its operational processes to enable innovation and enhance production.

6.6 Other findings

Advancements in technology have enabled organisations to enhance their communication and visibility, thereby enabling them to remain competitive in the markets. In a study by Alzahrani, Mahmud, Thurasamy, Alfarraj, and Alwadain (2021) involving 115 junior personnel, it was concluded that the top management of the organisation bears the responsibility of mitigating resistance to change by the subordinates. This can be achieved by adequately introducing the applications to the end-users and involving them in the process of ERP implementation. Furthermore, organisations could mitigate employee resistance to change by implementing an ERP with features that have simple interfaces that are easy to use (Alzahrani et al., 2021). Additionally, it is crucial for leaders to ensure that the ERP is appropriately aligned with the organisation's processes.

The culture of an organisation, including its values, assumptions, and interpretations, should be perceived as its core, and the connection between employees and culture must be evident (Goldston, 2019). Leaders must introduce strategies and goals to the organisation, while allowing employees, who are the implementers of the programmes, to refine and adapt the strategies to meet the values and vision of the organisation. Open channels of communication are often overlooked as a component that leads to successful change implementation, despite being a critical factor in effectively building relationships throughout the ERP implementation process. Communication channels should be enforced, and team spirit must be maintained through open communication channels throughout the ERP lifecycle (Le Pennec & Raufflet, 2018).

Quality management and a detailed data migration plan

The literature analysis of this study highlights the fact that technological fit alone is not sufficient for an organisation to gain a competitive advantage. Menshikova et al. (2019) emphasised the importance of technology fit for any proposed system to maintain individual performance at a prominent level in the organisation. Knauer et al. (2020) suggested that the measures for system implementation should include accurate data quality migration from the traditional system, timely data, and comprehensive end-user training. A detailed data migration plan should be in place during ERP implementation, including a data cleansing process and procedures to prepare users for data quality in business application processes. These measures would improve productivity, ensure system fitness, usage, and performance in the workplace.

The successful implementation of ERP requires alignment with the organisation's programmes and processes, as well as a detailed migration plan. The current study has identified several critical success factors, including cultural change and readiness, business process re-engineering, quality management, end-user training, and open and transparent communication. While the study has addressed the research questions and identified mediating factors that facilitate ERP

implementation, it has also uncovered interesting findings, emotions, and concerns among employees that go beyond the study's scope.

6.7 Study contributions

This study addressed the scarcity of research evidence on ERP implementation in public sector organisations, utilising the mediating factors that draw their strength from knowledge management. Adopting a mixed method design, the study aims to provide a comprehensive understanding through the qualitative phase of screening ERP implementation factors, coupled with a broader perspective of surveys in a quantitative phase. The investigation explores the socio-technical environment in which the government sector operates and the dynamics of the Southern African technology perspective upon ERP implementation. It also examines the perceived challenges and benefits of ERP adoption in the public sector, utilising a socio-technical lens to provide theoretical evidence for the implementation of a suitable ERP system for the organisation. The questionnaire distributed to the literature that reflected the mediating factors between knowledge management and the successful implementation of the ERP, and the interviews helped to obtain the thoughts, feelings, and beliefs of the employees regarding the ERP implementation in the organisation.

This study has made an original contribution to the research field of ERP adoption and implementation, particularly in the context of public sector organisations in South Africa. The use of both qualitative and quantitative data collection methods has provided a deeper understanding of the mediating factors that contribute to the successful implementation of ERP systems. The study has also broadened the scope of knowledge and industrial practices related to ERP system applications, providing valuable insights for organisations considering the adoption of such systems.

6.7.1 Knowledge contribution

This study makes a significant contribution to the current body of knowledge on ERP implementation requirements. In Chapter Two of the study, the factors that influence ERP requirements elicitation in public sector organisations were

examined. While a number of techniques and frameworks have been suggested for successful ERP implementation, these frameworks have not specifically addressed the challenges of the public sector or the software challenges that may arise. This study critically evaluated the strengths and weaknesses of existing ERP frameworks and proposed a conceptual framework that takes into account the challenges, benefits, strengths, and weaknesses of ERP (as outlined in Chapter Two).

6.7.2 Theory contribution

This study adopts Badewi et al.'s (2018) theory (see Chapter Two) and focuses on the organisational benefits of ERP that should be considered when making strategic decisions. However, there are still gaps in the literature regarding selected variables for ERP implementation. Therefore, this study proposes mediating variables that can help public sector organisations implement their ERP system. The researcher believes it is crucial to develop an ERP framework that public sector organisations can use to implement their ERP system successfully. The results of this study may interest various researchers in the information technology field, particularly computer lecturers, PhD and MSc students, ERP developers, ERP consultants, and other researchers in the information systems field. This area is currently receiving significant research attention, and this study contributes to the discussion of developing new ways of thinking about ERP implementations.

6.8 Limitations of the study

The literature reviewed in this study increased the complexity of analysing ERP implementation as a phenomenon. However, the limited availability of literature on ERP adoption and implementation in public sector organisations, particularly in South Africa, was also apparent. The conceptual framework presented in Chapter Three was based on analyses of a few development and model design studies theorised in the literature, and the mediating factors were considered most appropriate for the South African context. Future research studies may provide additional crucial links. It should be noted that this study was inspired by preceding research (Al-Harthi & Saudagar, 2020; Alsharari, 2022; Behera & Dhal, 2020; Fernandez & Aman, 2018; Malik & Khan, 2021); however, none of these studies

was conducted in the South African public sector context. Muyambi's (2019) study was limited to the KwaZulu-Natal context, while Cebekhulu et al.'s (2020) study focused on critical success factors of ERP implementation in the South African public sector.

The study has a limitation in the use of purposive sampling technique for the qualitative study, as it restricted participation to only senior managers in the organisation. This resulted in other employees who were willing to participate in the interviews being excluded. Additionally, the fact that the researcher is part of the senior management of the organisation raises questions about potential bias in the ethnographic research method. To obtain a more comprehensive picture of experiences, selecting champion ERP users from different branches in various provinces could have been considered. This would have taken into account varying contexts, work environments, resource availability, top management availability, and system helpdesk accessibility due to connectivity issues. Bailey (2018) noted that consultants should be cognizant of the culture of the organisation where they implement the software to better understand their needs.

One limitation of the study was that the surveys and interview guide used allowed employees to suggest factors not originally included, which were then incorporated after the pilot study. This approach may have introduced bias into the study. The questionnaire only used data from the single public sector organisation on which the study was based, rather than considering all such organisations, due to the limited number of ERP adopters. Consequently, the diverse population may not be fully represented in the research findings. Additionally, the researcher's position as an employee of the same organisation that had adopted the ERP may have introduced bias, as they did not use the ethnographic research method. Time constraints also posed a limitation, as interviewees were often busy with their jobs, making it difficult to gain their participation.

The study's sample size was limited to the employees of NYDA, making it difficult to generalise the findings to other public entities that may have different settings and resources. Future research could consider expanding the sample to include other state-owned entities to increase the breadth of generalisation to a wider

population. Furthermore, similar research needs to be conducted in all public organisations to expand the findings to the broader usage of ERP, rather than being specific to the NYDA.

6.9 Recommendations of this research

The study aimed to develop a conceptual framework that would facilitate the successful adoption and implementation of ERP in the public sector, while also conducting a detailed analysis of the ERP subject that generated further research questions. The study's objectives and conclusions provide an opportunity for academics and industry professionals to conduct further practical ERP implementations or research. Although the empirical findings validated the proposed model, they are not limited to this study and should not be considered conclusive. Therefore, there is room for further development of this research. Based on the study's reflections and findings, the following recommendations can be made for future research:

- Public sector organisations that are considering the implementation of ERP should do so to remain competitive and make informed decisions, as none of the respondents in this study rejected the idea of having ERP installed in their organisation.
- Studies that analyse the strategic management information backbone and business processes through information technology are needed.
- This study's mixed methods approach to ERP adoption and implementation was successful for the specific organisation case studies. However, the vendor took longer than expected to complete the project implementation plans. To avoid disasters and manage vendor relationships well, it is recommended that organisations of a similar nature and stature adopt the same approach with the suggested variables and ensure that they manage their vendor relationship well and avoid re-allocation of design and installation tasks before the project is completed.
- This study expanded upon the critical success factors in ERP implementations in public sector organisations. To maintain competitive

advantage, top management should work closely with ERP end-users, offer full training, enhance communication between business groups, and make conflict resolution attainable (Damali et al., 2021). To encourage innovation, the organisation must provide open, transparent communication and structures (Epizitone & Olugbara, 2019).

6.10 Future research

The findings of this study are significant for ERP implementers, future researchers, and organisations that aim to implement ERP. The conceptual framework suggested in this study identified factors that positively influence ERP implementation success, enabling project leaders to manage their projects more effectively and organisation leaders to have a clear understanding of their custom ERP. The results can also benefit vendors and service providers hired to implement ERP systems by enabling them to make informed decisions, anticipate problems, and avoid factors that may delay implementation. To ensure a successfully aligned ERP system, it is crucial for the project team to engage with representatives from all subdivisions of the end-users during pre-implementation to consult about business processes and features required for each intervention.

A clear project timeline should be presented to the organisation that is adopting the ERP, to enable clear tracking of activities from the inception of the project. The vendor and the IT team should participate in a well-documented knowledge transfer and sharing process, and provide practical training to the users of the ERP, for a better understanding and easier transition into the new system. It is essential for the organisation to prioritise top management support and constant communication to introduce the staff members to change management. To inform senior managers of what is happening at every step of the project, initiatives should be conducted, focusing on change management, staff morale, business process re-engineering, and communication.

To ensure the successful implementation of an ERP system, end-user training should begin at the initial stage of the project implementation. The training needs

should be documented, and a realistic training schedule should be put in place that covers all necessary modules of the organisation's products, interventions, people involved, and their tasks, as well as all training courses and trainees. Sufficient training is crucial to overcome resistance to change by employees, and an assessment of training effectiveness should be conducted before the system goes live to avoid gaps in service or production delivery between the traditional system and the new system. All business processes should be identified and included, and various streams should be integrated into the new system's functional modules. An audit should be conducted after every module is loaded into the new system to ensure that the ERP meets the organisation's business needs. It is crucial to monitor the system after installation to ensure that it performs as intended.

Despite the insights gained from this study, there are still areas that require further investigation. For instance, the impact of data cleansing on ERP implementation success and the socio-technical factors specific to the organisation under study need to be further explored. Additionally, the flexibility and scalability of ERP systems for expanding business needs have not been comprehensively examined. Sandberg's (2008) study suggests that customised and inflexible systems may not meet the intended purpose and result in dissatisfaction. Therefore, research studies are needed to delve deeper into the issue of ERP flexibility. It is also worth noting that major ERP system vendors should conduct research to standardise their systems and ensure best practices.

Further research is needed to explore the effects of all mediating variables identified in this study on ERP success and ease of implementation. As indicated in the literature, these mediating factors are considered critical success factors and are likely to positively influence ERP project implementation success if properly considered. The scope of these mediating factors should be further investigated, expanded to the rest of South Africa, and focused on the domains of knowledge management and ERP implementation success variables, either together or separately. Other factors, such as the appropriate budget, system acquisition, organisational culture, socio-cultural factors in a South African environment, and

vendor sourcing, which were not covered in this research, are also critical to the success of ERP implementation and should be included in future studies.

The study utilised a mixed method design, but the sample was drawn from a single organisation, limiting its generalizability. To address this limitation, future research should consider sampling from different organisations in different sectors and provinces. The present study may serve as a starting point for such research. Additionally, an abridged version of the questionnaire used in this study could be employed in other public sector organisations to investigate the order release and dispatching stages. The theoretical framework utilised in this study has no inherent limitations to its extension or revision.

6.11 Research conclusion

The study aimed to investigate the relationship between knowledge management and implementation success in the IT industry by employing a conceptual framework (model). The results of the study indicated that intermediary factors such as employee morale, change management, business process re-engineering, change management, and knowledge transfer positively influenced the success of the implementation. In addition to project governance, the survey results showed that other factors such as end-user training, vendor support, top management support, and ongoing communication also had a positive impact on implementation success, which was contrary to the participants' initial expectations. Therefore, further investigation is required to examine these factors as success factors for ERP implementations. Due to the considerable financial investment required for ERP, and the positive correlation between the independent variable (KM), mediating variables and the dependent variable (ERP implementation success), it is recommended that a strong business study and alignment of objectives is conducted before commencing any implementation. ERP is a multi-objective and multi-purpose system that streamlines business processes and is highly recommended as it operates on a cloud network and enables multiple users to work simultaneously without interference.

Based on the findings of this research study, it is recommended that industry managers adopt the recommendations and consider their long-term impact on IT systems applications in the public sector. Further research in this area by other researchers can help reveal more sub-topics and frameworks surrounding ERP applications in the public sector. The limitations of this study include the complexity of the findings and recommendations, which create opportunities for further research. According to Yin (2009), these findings can be theoretically corrected or simplified, taking into account the sample of only two case studies.

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APPENDICES

- Appendix A: Permission to conduct research.

nyda
NATIONAL YOUTH DEVELOPMENT AGENCY
OUR YOUTH. OUR FUTURE.

RE: NATIONAL YOUTH DEVELOPMENT AGENCY APPROVAL TO CONDUCT PHD RESEARCH

Dear Ms., Nompumelelo Zuma,

The purpose of this letter is to inform you that permission to conduct the research titled *"the Nexus between the Knowledge Management (KM) and the Enterprise Resource Planning (ERP) system implementation (the NYDA case Study)." is* granted.

The onus rest with you as the Researcher to schedule appropriate times and place to solicit interviews. The Executive Director will assist in guiding the researcher on appropriate and or relevant person(s) to assist the researcher in conducting the interviews for the research.

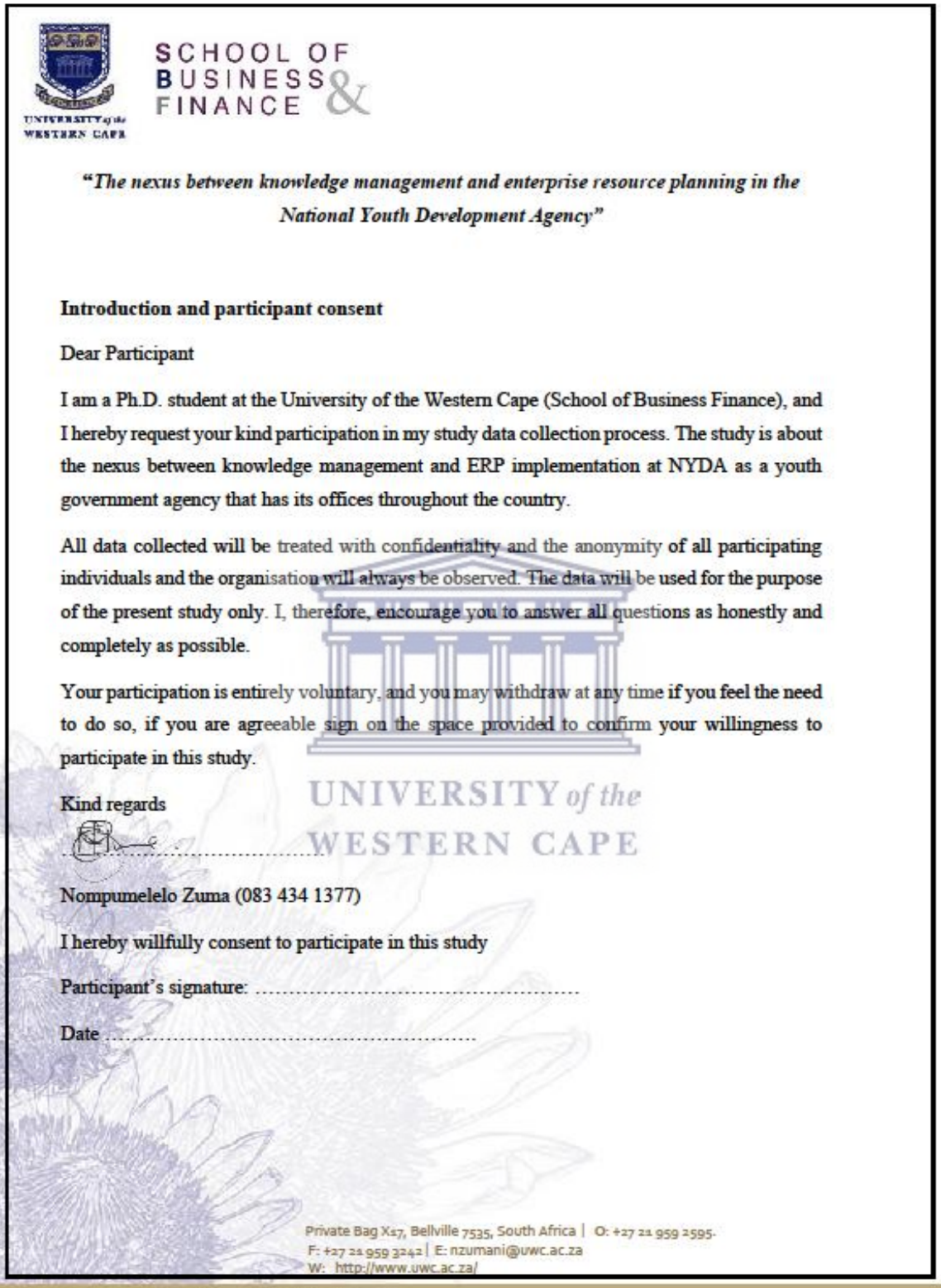
The researcher must also make every effort to conduct goodwill and ethical behaviour during the duration of the study. The research conducted must not hamper the day to day working environment of the organisation. Prior written questions for the interviews should be sent to the relevant persons for consideration to make the process efficient. The NYDA and the Executive Director and or Senior Manager within the relevant division reserves the right to have access to the study before it is published for approval.

Yours Sincerely,

Mr Walter Bango (Snr Manager: NYDA)

54 Maxwell Drive | Woodmead North Office Park | Woodmead | 2191
P O Box 982 | Halfway House | Midrand | Johannesburg | Gauteng | South Africa | 1683
Tel: +27 11 651 7000 | Fax: +27 86 539 6926 | e-mail: info@nyda.gov.za | www.nyda.gov.za

- Appendix B: Consent letter



SCHOOL OF BUSINESS & FINANCE

UNIVERSITY of the WESTERN CAPE

"The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency"

Introduction and participant consent

Dear Participant

I am a Ph.D. student at the University of the Western Cape (School of Business Finance), and I hereby request your kind participation in my study data collection process. The study is about the nexus between knowledge management and ERP implementation at NYDA as a youth government agency that has its offices throughout the country.

All data collected will be treated with confidentiality and the anonymity of all participating individuals and the organisation will always be observed. The data will be used for the purpose of the present study only. I, therefore, encourage you to answer all questions as honestly and completely as possible.

Your participation is entirely voluntary, and you may withdraw at any time if you feel the need to do so, if you are agreeable sign on the space provided to confirm your willingness to participate in this study.

Kind regards

.....

Nompumelelo Zuma (083 434 1377)

I hereby willfully consent to participate in this study

Participant's signature: .....

Date .....

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 2595.
F: +27 21 959 3242 | E: nzumani@uwc.ac.za
W: http://www.uwc.ac.za/

- Appendix C: Quantitative study consent form

SCHOOL OF BUSINESS & FINANCE

INFORMED CONSENT FORM

- **Study title:** The nexus between knowledge management and enterprise resource planning (the case of the NYDA)
- **Department:** Economic and Management Sciences
- **Proposed qualification:** PhD Business Management
- **Student Name:** Nompumelelo Zuma
- **Student Number:** 4177460
- **Email address:** 4177460@myuwc.ac.za
- **Tel:** 083 434 1377
- **Supervisor:** Dr Ntandoyenkosi Sibindi
- **Email:** nsibindi@uwc.ac.za
- **Tel:** 021 959 9531

HEAD OF DEPARTMENT

- **Prof Richardson Shambare**
- **email:** rshambare@uwc.ac.za,
- **Tel: 021 959 3220**
- **Prof Zivanayi Nyandoro**
- **email:** znyandoro@uwc.ac.za
- **Tel: 021 959 2240**

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
F: +27 21 959 3242 | E: :darendse@uwc.ac.za
W: http://www.uwc.ac.za/

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Participant to complete this section: **Please initial each box.**

1. I confirm that I have read and understand the information sheet for the above study. I have had an opportunity to consider the information, ask questions and have had these answered satisfactorily. [ ]
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. [ ]
3. I agree to take part in the above study. [ ]

Yes/ No

4. I agree to the use of anonymised quotes in publications [Y] [N]

_____

Signature of Participant Date

_____

Name of person taking consent Date

_____

Signature of person taking consent

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
F: +27 21 959 3242 | E: :darendse@uwc.ac.za
W: http://www.uwc.ac.za/

- Appendix D: Information sheet for a quantitative study

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INFORMATION SHEET FOR A QUNTITATIVE STUDY

Study title: The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency.

Introduction:

The study is a research on the nexus between knowledge management and enterprise resource planning in the National Youth Development Agency. Research is a process used in seeking new knowledge on a specific topic. In this study I want to learn the importance of aligning the knowledge management and its mediating variables when implementing the enterprise resource planning in a public sector organisation.

Invitation to Participate:

Dear Prospective Participant

You are being invited to take part in a research project titled "The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency".

The researcher will need about 30 minutes of your time to answer the survey questions used to collect information on your views and opinions about the adoption of the ERP system in the NYDA and challenges that you may have experienced during its implementation. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential and anonymous. No one other than the researchers will know your individual answers.

You are welcome to discuss this project with others if you wish before you make your decision. Please contact 4177460@myuwc.ac.za if there is anything that is not clear or if you would like additional information about the study.

The purpose of this study is to examine the nexus between Knowledge Management (KM) and Enterprise Resource Planning (ERP) in the public sector using the case study of the selected organisation.

The Objectives of the study are:

a) To determine the importance for organisations to have proper KM when implementing the ERP system.
b) To ensure that the organisations are aware of and maintain a positive staff morale during the ERP system implementation.
c) To prepare the organisations for change management adjustments on their operations post-ERP implementation.
d) Address the influence that the KM has on business process re-engineering during the ERP system implementation.
e) Address the influence that KM has on knowledge transfer across the organisation from the initial stage of the ERP implementation until the system is completely absorbed.
f) Give awareness on how organisations can use KM positively to create a positive effect on the organisation's performance during the ERP system implementation.

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
F: +27 21 959 3242 | E: :darendse@uwc.ac.za
W: http://www.uwc.ac.za/

Participation Process:

You will be required to answer a 30 minutes survey that will be sent via a link on your work email. Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will assist corporates in formulating inclusive and transformational processes that the South African public sector organisations may later adopt when implementing the ERP in their workplace.

Confidentiality

All information collected during the research will be kept strictly confidential. As an individual you will not be able to be identified in any reports or publications. You will be given a copy of the information sheet and, if appropriate, a signed consent form to keep. In addition, all COVID-19 protocols will be adhered to.

In terms of Protection of Personal Information Act, 4 of 2013 (POPIA), the researcher has a legal duty to collect, use, transfer and destroy NYDA's employees' personal information and that of an organisation in a lawful, legitimate, and responsible manner and in accordance with the provisions set out under POPIA. The participants will also, at the time of data collection be sent their own consent letters in which the researcher requests them to be part of the study. Senior staff members who will be interviewees will also receive informed consent letters which they will have to sign to give consent for being part of the study and to give consent on being recorded. The consent will serve as an adequate notification of the collection and processing of an organisational information.

Contact details

Humanities & Social Sciences Research & Ethics Committee (HSSREC)
UWC P O Box X17
Bellville 7535
South Africa
Email: research-ethics@uwc.ac.za
Tel: +27-21-959-2988

HOD contacts:

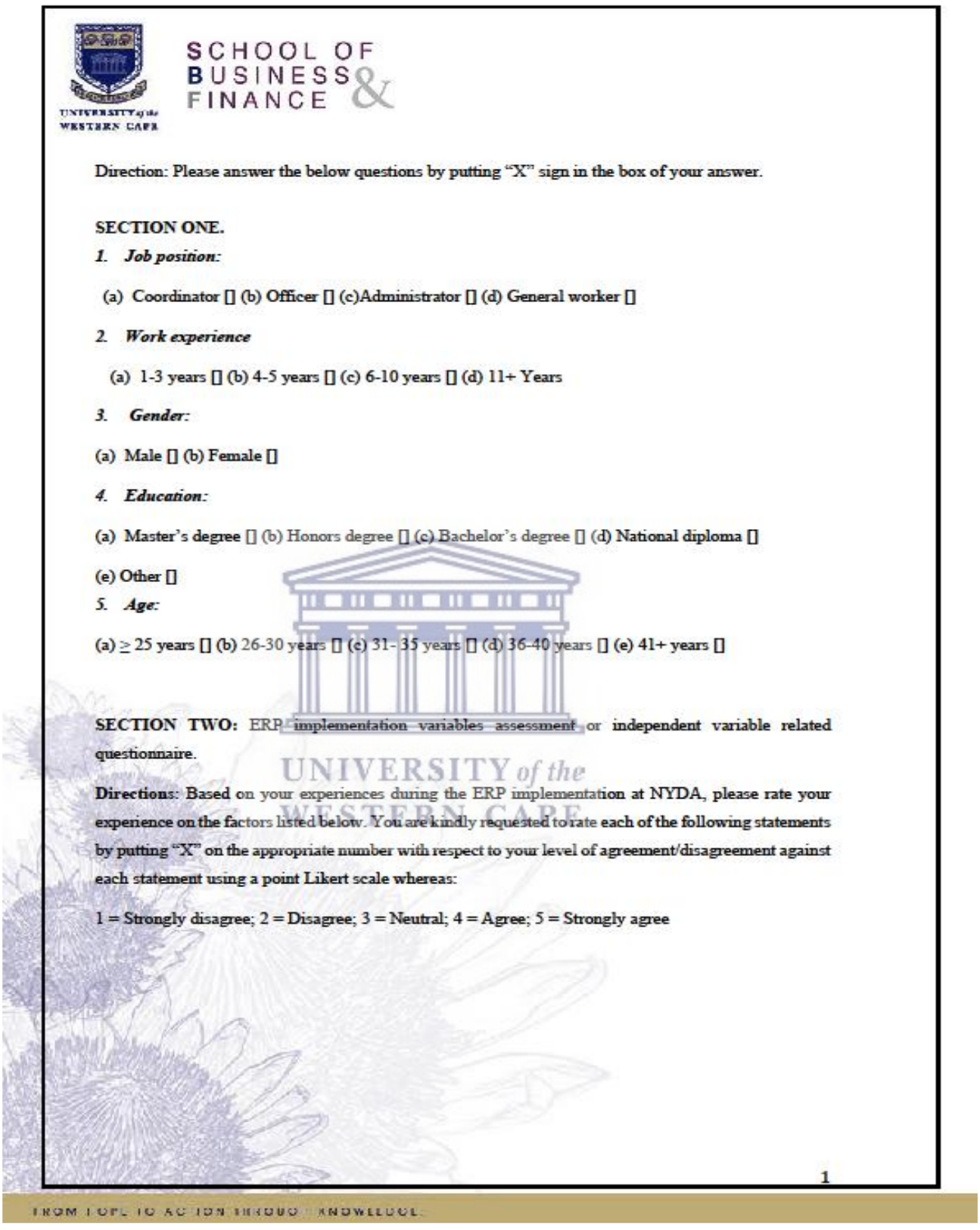
Prof Richardson Shambare
Email: rshambare@uwc.ac.za
Tel: 021 959 3220.

Prof Zivanayi Nyandoro
Email: znyandoro@uwc.ac.za
Tel: 021 959 2240

Researcher's contact details: 4177460@myuwc.ac.za
Tel: 083 434 1377

Supervisor's contact details: nsibindi@uwc.ac.za
Tel: 021 959 9329

- Appendix E: Survey



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Direction: Please answer the below questions by putting "X" sign in the box of your answer.

SECTION ONE.

1. ***Job position:***

(a) Coordinator [] (b) Officer [] (c)Administrator [] (d) General worker []

2. ***Work experience***

(a) 1-3 years [] (b) 4-5 years [] (c) 6-10 years [] (d) 11+ Years

3. ***Gender:***

(a) Male [] (b) Female []

4. ***Education:***

(a) Master's degree [] (b) Honors degree [] (c) Bachelor's degree [] (d) National diploma []

(e) Other []

5. ***Age:***

(a) ≥ 25 years [] (b) 26-30 years [] (c) 31- 35 years [] (d) 36-40 years [] (e) 41+ years []

SECTION TWO: ERP implementation variables assessment or independent variable related questionnaire.

Directions: Based on your experiences during the ERP implementation at NYDA, please rate your experience on the factors listed below. You are kindly requested to rate each of the following statements by putting "X" on the appropriate number with respect to your level of agreement/disagreement against each statement using a point Likert scale whereas:

1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree

1

FROM TOPL TO AC TON THROUG KNOWLEDGE

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No.	ERP IMPLEMENTATION VARIABLES	LEVEL OF AGREEMENT				
		Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
	Knowledge Transfer					
6.	A training program was put in place and was adhered to.					
7.	There was enough knowledge transfer from the consultant to the end-users.					
8.	End-users were involved from the beginning of the project and knowledge was transferred by the vendor.					
9.	Sufficient training was allocated to my training.					
10.	The training was practical and training materials were developed specifically for my job.					
	Staff Morale and Training					
11.	I received sufficient technical training prior to ERP take-off.					
12.	The training enhanced my proficiency and level of knowledge for ERP					
13.	I have been offered continual training during implementation.					
14.	The training covers all aspects and the products I deal with.					
15.	Enough training was offered on how to find, understand, access, or use data and navigate the system.					
	Business Process Re-engineering					
16.	ERP implementation brought easy processes to all the deliverables					
17.	It took me little time to migrate and understand the ERP system					
18.	All the traditional deliverables processes and responsibilities were perfectly matched into the ERP					
19.	ERP system was perfectly aligned with the existing process of the organization.					
20.	Migration of data from the traditional system to ERP was easy and accurate.					
	Change Management					
21.	The ERP has been easily adaptable to business changes.					
22.	With the ERP in place, the organization has increased the standardization of processes.					

23.	The organisational readiness to change was regularly assessed.					
24.	The management continually reminded the staff members of the perceived benefits to come because of implementing the ERP.					
25.	There was clear communication throughout the duration of the ERP Implementation to keep staff informed.					
	Organization performance improvement					
26.	The ERP system has helped with providing reports that seem to be just about exactly what I need.					
27.	The ERP system has provided the flexibility to be able to respond to a need for changing data.					
28.	The ERP system has provided a positive impact on the productivity of my job.					
29.	The implementation of the ERP system has enhanced my performance					
30.	The ERP system had allowed me to accomplish more work than would otherwise be possible.					
	ERP implementation success					
31.	I understood how my business processes would fit into the ERP process flow.					
32.	All business processes were tested to ensure that they were functioning.					
33.	Adequate integration testing of all the business processes was carried out.					
34.	All the areas of the business operation were represented in the project team responsible for the ERP implementation.					
35.	The adoption of ERP has greatly improved the quality of communication within our organization.					
	Your overall impression of ERP implementation					
36.	The adoption of ERP has enhanced our ability to develop business alliances and external linkages.					
37.	The adoption of ERP has significantly improved the quality and availability of information for decision making.					

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38.	My duties and responsibilities on the project were clear to me.					
39.	ERP adoption has improved the integration of our business processes.					
40.	The adoption of ERP has allowed us to differentiate more effectively our products and services.					

41. Would you like to offer any suggestions or comments on an overall ERP Implementation project at NYDA? Please forward it here through the open space provided----------
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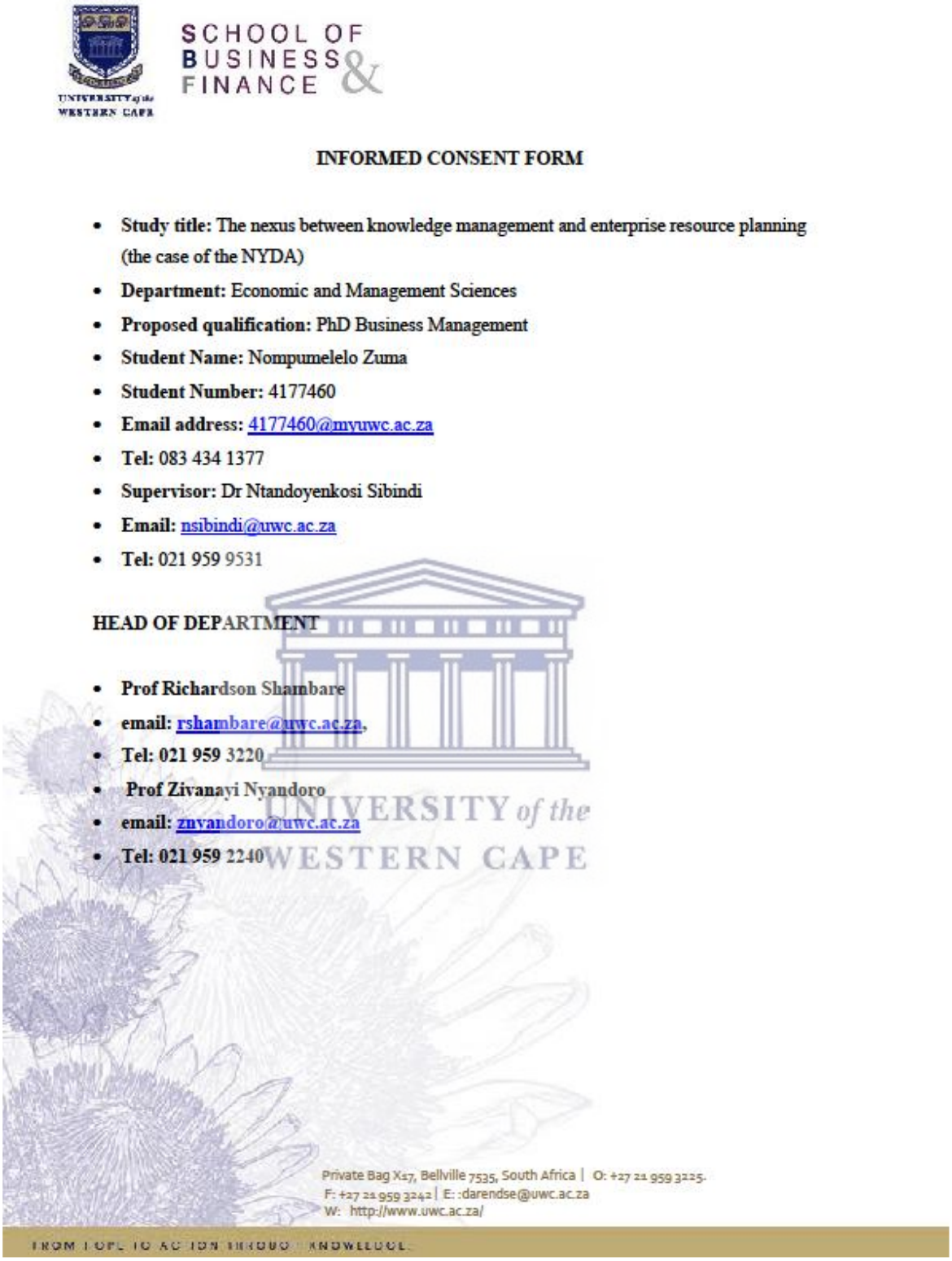
- Appendix F: Qualitative study consent form



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INFORMED CONSENT FORM

- **Study title:** The nexus between knowledge management and enterprise resource planning (the case of the NYDA)
- **Department:** Economic and Management Sciences
- **Proposed qualification:** PhD Business Management
- **Student Name:** Nompumelelo Zuma
- **Student Number:** 4177460
- **Email address:** 4177460@myuwc.ac.za
- **Tel:** 083 434 1377
- **Supervisor:** Dr Ntandoyenkosi Sibindi
- **Email:** nsibindi@uwc.ac.za
- **Tel:** 021 959 9531

HEAD OF DEPARTMENT

- **Prof Richardson Shambare**
- **email:** rshambare@uwc.ac.za,
- **Tel: 021 959 3220**
- **Prof Zivanayi Nyandoro**
- **email:** znyandoro@uwc.ac.za
- **Tel: 021 959 2240**

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Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
F: +27 21 959 3242 | E: :darendse@uwc.ac.za
W: http://www.uwc.ac.za/

FROM TOPIC TO ACTION THROUGH KNOWLEDGE

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Participant to complete this section: **Please initial each box.**

1. I confirm that I have read and understand the information sheet for the above study. I have had an opportunity to consider the information, ask questions and have had these answered satisfactorily. [ ]
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. [ ]
3. I agree to take part in the above study. [ ]
4. I agree to the interview being recorded [ ]

Yes/ No

5. I agree to the use of anonymised quotes in publications [Y] [N]

_____

Signature of Participant Date

_____

Name of person taking consent Date

_____

Signature of person taking consent

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
F: +27 21 959 3242 | E: :darendse@uwc.ac.za
W: http://www.uwc.ac.za/

- Appendix G: Information sheet for a qualitative study

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INFORMATION SHEET FOR A QUALITATIVE STUDY

Study title: The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency.

Introduction:

The study is a research on the nexus between knowledge management and enterprise resource planning in the National Youth Development Agency. Research is a process used in seeking new knowledge on a specific topic. In this study I want to learn the importance of aligning the knowledge management and its mediating variables when implementing the enterprise resource planning in a public sector organisation.

Invitation to Participate:

Dear Prospective Participant

You are being invited to take part in a research project titled "The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency".

The researcher will need about an hour of your time for an interview to collect information on your views and opinions about the adoption of the ERP system in the NYDA and challenges that you may have experienced during its implementation. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential and anonymous. No one other than the researchers will know your individual answers.

You are welcome to discuss this project with others if you wish before you make your decision. Please contact 4177460@myuwc.ac.za if there is anything that is not clear or if you would like additional information about the study.

The purpose of this study is to examine the nexus between Knowledge Management (KM) and Enterprise Resource Planning (ERP) in the public sector using the case study of the selected organisation.

The Objectives of the study are:

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c) To prepare the organisations for change management adjustments on their operations post-ERP implementation.
d) Address the influence that the KM has on business process re-engineering during the ERP system implementation?
e) Address the influence that KM has on knowledge transfer across the organisation from the initial stage of the ERP implementation until the system is completely absorbed.
f) Give awareness on how organisations can use KM positively to create a positive effect on the organisation's performance during the ERP system implementation.

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 3225.
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W: http://www.uwc.ac.za/

Participation Process:

You will be required to attend a semi-structured virtual interview on MS Teams for an hour. Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will assist corporates in formulating inclusive and transformational processes that the South African public sector organisations may later adopt when implementing the ERP in their workplace.

Confidentiality

All information collected during the research will be kept strictly confidential. As an individual you will not be able to be identified in any reports or publications. You will be given a copy of the information sheet and, if appropriate, a signed consent form to keep. In addition, all COVID-19 protocols will be adhered to.

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Contact details

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HOD contacts:

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Email: rshambare@uwc.ac.za
Tel: 021 959 3220.

Prof Zivanayi Nyandoro
Email: znyandoro@uwc.ac.za
Tel: 021 959 2240

Researcher's contact details: 4177460@myuwc.ac.za
Tel: 083 434 1377

Supervisor's contact details: nsibindi@uwc.ac.za
Tel: 021 959 9329

- Appendix H: Interview guide

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Qualitative Research – The Interview Guide (as a guideline only)

Introduction

Thank you for meeting with me today. I am currently researching the nexus between knowledge management and enterprise resource planning in the National Youth Development Agency. Specifically, I am interested in exploring how the NYDA shared knowledge internally during the implementation of the ERP in the organization. I am also interested to know if the mediating variables played any role in this ERP implementation.

Informed Consent form

To make you feel comfortable, I would like to present you with the consent form. I will answer any questions that you may have about what this study involves. I consider you an expert on this topic and would appreciate your ideas, perceptions, and opinions.

- This form explains how we are doing our research. The purpose of this form is to help you decide whether you want to be interviewed or not.
- The interview will last about 30 minutes and it will be audio recorded. You don't need to answer any questions if you do not want to, and you can stop the interview at any time.
- We will be using the information from the interview to help us create a better understanding of the importance of knowledge management during the ERP implementation
- Information from this interview will remain confidential and your name will not be revealed.

A brief overview of the research will be given before starting the interview by the researcher for an easy answering process for the participant. However, when answering each interview question, the interviewee will be asked to address the key aspects of the research such as "What, How, Why, With an ERP implementation success".

Introductory questions

1. What is your job role within the organization?
2. How many years of working experience in this organization?

ERP package knowledge

3. Do you think the ERP implementation process was handled in a correct manner?
4. Was the introduction of staff members handled correctly?
5. Which area of the ERP system do you find most challenging?
6. How do you plan to overcome this challenge? How was your experience?
7. Was there a prior communication regarding the need for the ERP in the organisation?
8. How long before the actual implementation was communicated to you?
9. Do you think the ERP is a fit for the organisation?

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 2595.
F: +27 21 959 3242 | E: nzumani@uwc.ac.za
W: http://www.uwc.ac.za/

10. Did you ever feel there was a need for a system with such capabilities?

Training for ERP

11. Do you think it is necessary to have training for the system before its implementation?
12. Was there any training given for the system?
13. Was the training efficient enough to understand the system?
14. Do you have any platform to direct any queries or difficulties experienced when using the system?
15. What is the significant difference between the ERP and the traditional system?
16. What were the main challenges you experienced during the ERP implementation stage? Were they resolved?
17. Do you think your morale ever changed during the implementation phase of the ERP? Was it a negative or a positive change?

Outputs and expectations

18. Do you think the system meets your expectations?
19. Does it do what it was meant for?
20. Have you had any projects completed using the ERP system? How was your experience?
21. How is the efficiency of the system compared to the traditional system the organisation had?
22. Has the average time taken to complete the project changed while using the ERP system as compared to the traditional system?
23. Are there any significant changes you have noticed since using the ERP system on the delivery of services in the organisation?

Closing

Thank you for sharing your time and insights today.
Is there any other information that you think I should know about?
Do you have any questions about this interview, or what we talked about?
Key message 1: You've been great. Thanks so much for sharing your insights and your experiences.
Key message 2: Please don't hesitate to send us additional information or remarks by email, if anything comes to mind later.

Wrap-up

Do you have anything else you want to share with us currently?
May we contact you in the future if we have other follow-up questions?
I appreciate you sharing your valuable time and your insights with me. I know I learned a lot from our conversation. I'll provide you with the transcript of our conversation if you would like.
If any other thoughts come to mind about the topic we discussed, please feel free to contact me.

Private Bag X17, Bellville 7535, South Africa | O: +27 21 959 2595.
F: +27 21 959 3242 | E: nzumani@uwc.ac.za
W: http://www.uwc.ac.za/

- Appendix I: Ethics committee approval letter

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50 YEARS of hope, action & knowledge

18 November 2021

Mrs N Zuma
School of Business and Finance
Faculty of Economic and Management Sciences

HSSREC Reference Number:	HS21/9/5
Project Title:	The nexus between knowledge management and enterprise resource planning in the National Youth Development Agency.
Approval Period:	**17 November 2021 – 17 November 2024**

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology, and amendments to the ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November each year for the duration of the project.

For permission to conduct research using student and/or staff data or to distribute research surveys/questionnaires please apply via:
https://sites.google.com/uwc.ac.za/permissionresearch/home

The permission letter must then be submitted to HSSREC for record keeping purposes.

The Committee must be informed of any serious adverse events and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Director: Research Development
University of the Western Cape
Private Bag X 17
Bellville 7535
Republic of South Africa
Tel: +27 21 959 4111
Email: research-ethics@uwc.ac.za

NHREC Registration Number: HSSREC-130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

Appendix J: Editor certificate

Appendix K: Language Proofreading confirmation