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Factors affecting enterprise resource planning migration: the South African customer's perspective

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FACTORS AFFECTING ENTERPRISE RESOURCE PLANNING MIGRATION: THE SOUTH AFRICAN CUSTOMER'S PERSPECTIVE



A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF COMMERCE IN THE FIELD OF INFORMATION SYSTEMS

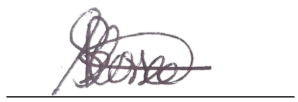
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Submission Date: September 2021

DECLARATION

I declare that this research report is my own unaided work, except to the extent indicated in the text, acknowledgements, and reference matter. It is being submitted for the 50% research component of a Master of Commerce degree (by Research and Coursework) at the University of the Witwatersrand, Johannesburg.

It has not been submitted before for any other degree or examination in this or any other institution.



Precious R. Mushayi

11 September 2021

Date

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ABSTRACT

Enterprise resource planning (ERP) systems are a crucial and strategic component of most organisations' information systems (IS). The advent of the digital economy has pushed traditional ERPs to evolve into intelligent ERP systems that are built to integrate with smart technologies such as artificial intelligence and machine learning.

There is a need to understand how the digital economy has affected the design of ERP systems and how customers in developing countries are adapting to these changes. The purpose of this study was to identify the factors that influence the decisions of ERP customers in developing countries on whether to adopt intelligent ERP technologies such as SAP S/4 HANA.

The technological-organisational-environmental and institutional theory frameworks were used as the foundation upon which the factors that influence intelligent ERP adoption were studied. The study focused on adopters and non-adopters of SAP S/4 HANA in the South African context.

Guided by the positivist paradigm, a questionnaire-based survey was developed using theoretical constructs from existing studies of technology adoption and distributed to a sample of 95 companies, which were selected through purposive sampling. Nine factors were hypothesised to have an impact on intelligent ERP adoption, namely information, communication and technological (ICT) infrastructure, the availability of cyber-security systems, technical skills, organisational size, top management support, coercive pressures, mimetic pressures, normative forces and governmental regulations. Based on the responses received from 84 organisations, four factors out of the nine initial factors were found to have a significant impact on intelligent ERP migration, namely ICT infrastructure, the availability of cyber-security systems, mimetic forces, and normative pressures.

This study may be useful to ERP vendors with customers in developing countries, to understand existing and potential customer perceptions of intelligent ERPs. It will also give insight to academics who seek to build on their understanding of technology adoption in developing countries, especially in this era of digital transformation.

Keywords: Intelligent ERP, Migration, Adoption TOE, Institutional Theory, Digital Transformation.

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LIST OF ACRONYMNS AND ABBREVIATIONS

AI- Artificial Intelligence

DOI- Diffusion of Innovation theory

ERP- Enterprise Resource Planning

ICT- information and communications technology

IOT- Internet of Things

IS- Information Systems

IT- Information Technology

KMO- Kaiser-Meyer-Olkin Measure of Sampling Adequacy

MRP- Materials Requirement Planning

SAP ECC 6.0- SAP ERP Central Component 6.0

SAP S/4 HANA- SAP Business Suite 4 HANA

SAP- Systems, Applications and Products

SEM- Structured Equation Modelling

SPSS- Statistical Package for the Social Sciences

TAM- Technology Acceptance Model

TOE- Technological, Organisational, Environmental Framework

TPB- Theory of Planned Behaviour

UNDP- United Nations Development Programme

UTAUT- Unified theory of acceptance and use of technology

1. INTRODUCTION

This introductory chapter will give context to the study by outlining foundational aspects such as the background to the study and the context within which the study was conducted. The aims and objectives of the study will be introduced, and the anticipated aims and objectives of the study will also be outlined. Delimitations and assumptions of the study will also be mentioned in this chapter.

1.1 Context And Background

Enterprise resource planning (ERP) systems have steadily made inroads into enterprise computing, and over the past 40 years have become the focus of innovation, establishing themselves as the main stream of enterprise computing (Wu, 2016). ERP systems such as SAP, JD Edwards, and Oracle are information systems (IS) that enable the integrated processing of an organisation's core business transactions. This integration enables a business to reduce costs and increase efficiency by ensuring that information is timeously made available to the right people in the organisation, thus allowing users to manage business resources in a proactive and productive manner (McGaughey & Gunasekaran, 2007).

In the early days, ERP systems such as SAP were marketed to enterprises as pre-packaged suites of business processes that were representative of industry best practices. However, the high expectations of customers who bought into this promise were largely unfulfilled, with one study concluding that only 13 per cent of firms that had adopted ERP had their business expectations met, while more than 50 per cent of firms reported unsatisfactory adoption of ERP (Mahmood et al., 2019; Panorama Consulting, 2008). Similar sentiments have been expressed by South African organisations that have adopted ERP systems, with issues such as inadequate budgets, poor leadership and lack of skills being cited as key reasons for the failure of South African ERP implementations (Plessis & Mwalemba, 2016).

Against the backdrop of this disillusionment and dissatisfaction, the global economy is rapidly evolving into a digital economy. The era of the digital economy has been characterised by the emergence of systems that harness and integrate the capabilities of computation, networking and physical processes (Piccarozzi et al., 2018). The introduction of revolutionary technologies such as the internet of things (IoT), artificial intelligence (AI), robotic process automation and cloud computing have not only significantly changed the "what" and the "how" of doing things, but have also changed "who" we are (Piccarozzi et al., 2018). Križanić et al. (2019) highlight that

key concepts of digital transformation, such as customer-centricity and innovation commitment, have driven ERP vendors to change the way in which ERP systems are configured, as well as how the systems store and extract data (Križanić et al., 2019).

These changes have led to the launch of "new and improved" ERP solutions called intelligent ERPs, which existing ERP customers are being encouraged to migrate to if they are to gain a competitive advantage and remain relevant in the age of digital transformation. In some cases, soft ultimatums have been handed down to customers, as ERP vendors have given them deadlines by which they must migrate to the new next-generation ERP solutions (ASUG, 2018).

With the history of failed, delayed, and costly ERP implementation projects, ERP customers are faced with a dilemma, as they need to make critical decisions on their ERP systems in the age of digital transformation. ERP customers have had to consider three main options:

1. Choose to maintain their existing ERP versions and focus on alternative ways of remaining competitive and relevant.
2. Become early adopters of intelligent ERP and begin to reap the benefits of the new and upgraded ERP systems.
3. Adopt a wait-and-see approach, with the option to jump on the bandwagon later (Ahmed, 2019).

1.2 Problem Statement

There are numerous studies on the readiness of developing countries for the digital economy, also known as Industry 4.0 (Morrar et al., 2017; Prisecaru, 2016). For example, a 2018 study of Bangladesh's readiness for the digital economy found that poor infrastructure, availability of cheaper labour, expensive installation of technologies, lack of government support and lack of knowledge were challenges that hindered organisations from acquiring and fully exploiting the benefits that come with Industry 4.0 (Islam et al., 2018). There is, however, a need for more literature that gives better understanding of how Industry 4.0 has affected traditional ERP systems, as well as a need to assess the readiness of ERP customers in developing nations to embrace these new ERP technologies called intelligent ERPs.

The main research question of this study was "What are the factors that determine whether organisations in developing countries such as South Africa migrate to the new ERP versions that have been introduced by ERP vendors?"

For the purposes of this study, the researcher focused on one ERP system, namely the SAP Business Suite 4 SAP HANA (SAP S/4 HANA) ERP system. The study focused on the factors that influence both adopters and non-adopters of SAP S/4 HANA to ensure a balanced and objective view of the study. SAP S/4 HANA was chosen as the focus of this study as the researcher has significant experience working with SAP clients based in South Africa and was interested in finding out what the key adoption factors are that influence these clients. The prior knowledge that the researcher had of the SAP market in South Africa also assisted in the data collection process, as it was relatively easy to identify the organisations that are SAP customers.

1.3 Aims and objectives of the study

The purpose of this research is to broaden the understanding of intelligent ERP adoption, specifically in the context of developing countries, by identifying the factors that influence the decision on whether to adopt the new technology. The research model of this study will be based on a combination of the TOE framework and the institutional theory.

1.4 Importance of the study

1.4.1 Theoretical Impact

Various researchers have focused on ERP adoption, assimilations and upgrades in the traditional ERP space (Claybaugh et al., 2017; Ha & Ahn, 2014; Liang et al., 2007). There is, however, a gap in academic research on ERP migrations, specifically in the context of how the era of digital transformation has affected the adoption of new ERP technologies in emerging economies such as that of South Africa (Bayode, 2019; Lekhanya, 2019). This study seeks to add to the academic body of knowledge by focusing on intelligent ERP migrations in the context of a developing country.

1.4.2 Practical Impact

As most ERP vendors seek to position intelligent ERPs in the enterprise computing market, this study could potentially be used by ERP vendors and ERP implementation partners to understand

better how customers perceive intelligent ERPs, as well as the adoption factors considered by customers who operate in the context of a developing country. The research could also shed light on the specific areas where more investment in IS needs to be made to ensure that customers in developing countries can fully harness and embrace the product offering of intelligent ERP systems.

Delimitations and Assumptions

Only one ERP technology was assessed in the study, namely the SAP S/4 HANA ERP system. The study focused on companies that are based in South Africa, as the researcher is based in South Africa and SAP is one of the most frequently used ERP solutions in South African business organisations.

1.5 Structure of the report

This chapter has laid the foundation for the study by introducing key concepts and defining the context in which this study was conducted. The introduction also sheds light on why it is important to carry out the research so that it can benefit academia as well as IS practitioners. The remainder of this research paper will detail the findings from a review of existing academic literature and outline the theoretical research model, as well as the methods for testing the proposed model. Data analysis will be conducted, and the results of the data gathered will be discussed.

2. LITERATURE REVIEW

This chapter will give a detailed outline on the background of intelligent ERPs as well as substantiate the existence of the research problem derived from performing a literature gap analysis. The purpose of the literature review is to explore and evaluate what is contained in the academic body of knowledge regarding the factors that influence ERP migrations in the digital economy, as well as to identify any gaps in existing literature.

In summary, the literature review will:

1. Present an overview of existing literature on Industry 4.0 and intelligent ERP systems.
2. Outline how ERPs such as SAP ERP ECC 6.0 have been disrupted by the digital economy, giving rise to the introduction of intelligent ERPs such as SAP S/4 HANA.
3. Identify factors of ERP migrations from existing literature.
4. Identify the gaps in existing literature and develop a research model based on existing theoretical frameworks that will help address the gaps in academic literature.

2.1 Evolution of ERP Systems

Enterprise computing has evolved significantly since the days of the introduction of the first mainframe computers in the 1960s, when the possibility of managing large amounts of data first became a reality (Asprion et al., 2018). The introduction of materials requirements planning systems (MRP I and II) in the 1970s and the 1980s respectively enhanced the computing capabilities of enterprise software, and this allowed organisations to plan better and control their manufacturing resources (Majstorovic & Stojadinovic, 2020).

Traditional ERP systems such as SAP, Oracle and JD Edwards were introduced in the 1990s and these solutions were focused on giving organisations the ability to integrate their core business processes across typical business units (Asprion et al., 2018). The next two decades saw these traditionally on-premise solutions evolving into ERP II in the 2000s, which is an internet-based ERP built on a service-oriented architecture. Cloud-based ERP emerged in the 2010s, and was introduced as an ERP that is offered on software as a service model (Majstorovic & Stojadinovic, 2020). The introduction of intelligent ERP in the 2020s is the next phase of the evolution of ERP and it is in the context of this phase of the evolution of ERP that this study is conducted.

The history of ERP systems, leading to intelligent ERPs of the 2020s, is depicted in Figure 2.1:

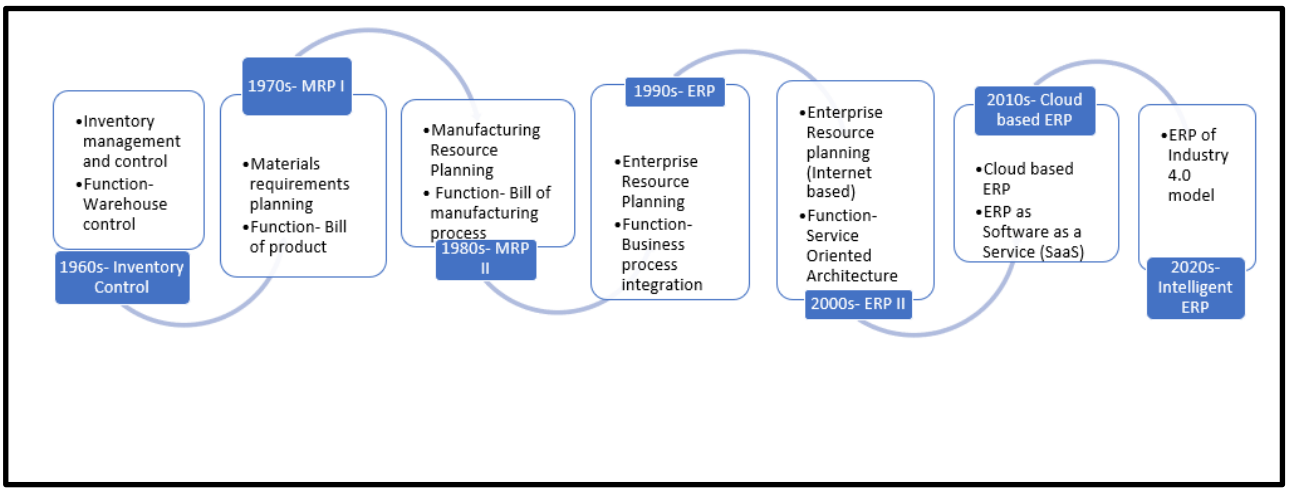


Figure 2.1: Evolution of ERP Systems (Adapted from Majstorovic & Stojadinovic, 2020)

2.2 Industry 4.0 And Intelligent ERP Systems

The world is going through a technological revolution, which has caused significant disruption in the way that people live and consequently in the way that organisations operate and engage with their stakeholders. This revolution has been termed "Industry 4.0" or the digital economy (Piccarozzi et al., 2018).

The digital economy is characterised by the proliferation of disruptive technologies that have the ability to connect the physical, technological and biological worlds (Bayode, 2019). World Economic Forum Chairman Klaus Schwab defines the era of the digital economy as being "characterized by a much more ubiquitous and mobile Internet, by smaller and more powerful sensors that have become cheaper, and by artificial intelligence and machine learning" (Prisecaru, 2016, p. 58). Other examples of disruptive technologies include the IoT, blockchain technologies, predictive analytics, augmented or virtual reality, and cloud computing (Bayode, 2019). The introduction of these technologies has propelled consumers to live in a world that is more connected, with highly intelligent systems that are more adaptive, predictive, and responsive. The effects of the impact of these disruptive technologies have led ERP vendors to re-evaluate the design and functionality of ERP systems. As the main source of most organisations' master data as well as transactional data, ERP systems have had to evolve into intelligent ERP systems, to which customers in the digital economy can easily adapt and that they can utilise in a more efficient manner. According to Morris et al. (2013), intelligent ERPs are ERP systems that utilise machine learning, analytics and big data to enable forecasting, learning, analysis, prediction, reporting and management of business resources and processes. As depicted in Figure 2.2,

Intelligent ERPs are designed to bring about improved user experience as they automate repetitive tasks and augment how less frequent tasks are performed. These systems are highly efficient, as they have the capability to analyse large volumes of data using in-memory computing (Morris et al., 2013).

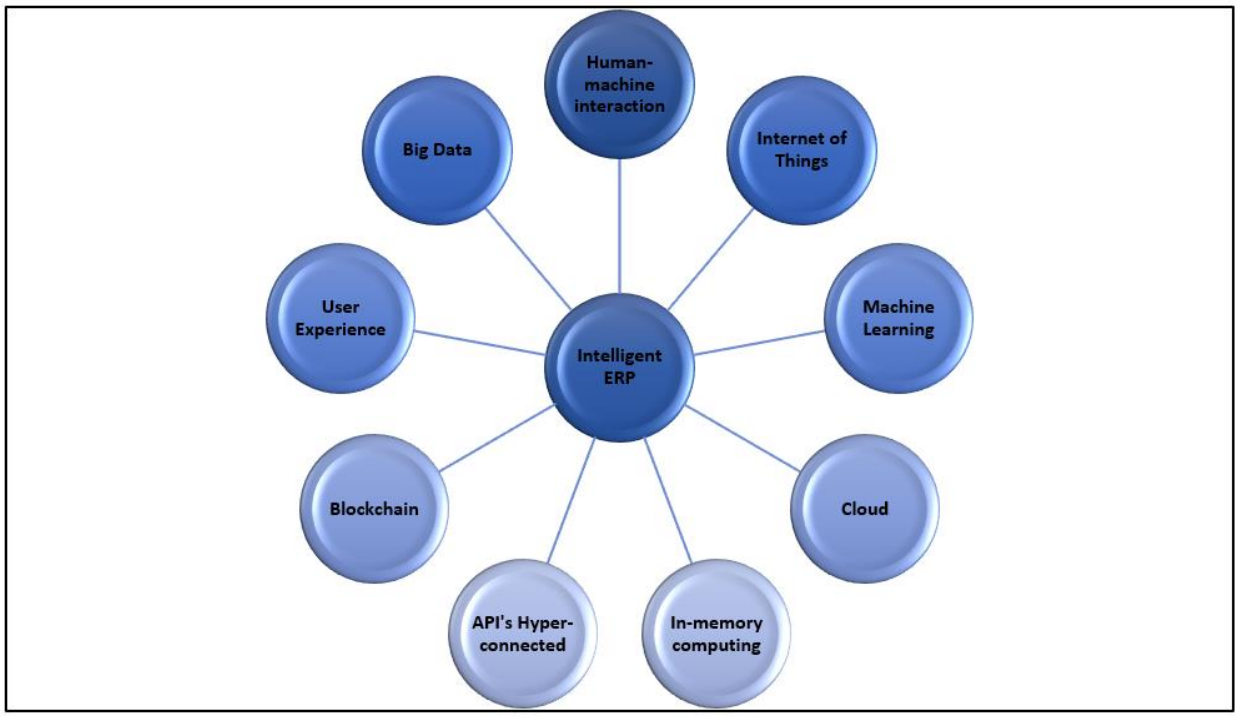


Figure 2.2: Intelligent Erp in the Digital Economy (*Adapted from i-SCOOP, 2019)*

Examples of intelligent ERPs include SAP S/4 HANA, Salesforce Einstein (Customer Relationship Management with advanced AI capabilities), IBM Kenexa Talent Insights (a cloud-based talent analytics solution), Oracle's Adaptive Intelligent Applications for ERP (ERP powered by AI and data-driven applications) and Microsoft's Dynamics CRM with Azure (CRM powered by machine learning) (i-SCOOP, 2019; Morris et al., 2013).

1) Examples of intelligent ERP: SAP S/4 HANA and Oracle ERP Cloud

SAP S/4 HANA and Oracle ERP Cloud stand high in the rankings of intelligent ERP solutions. These systems are the products of the evolution of the SAP ECC 6.0 and Oracle E-Business suite respectively. Both solutions are still in the early stages of development, which puts them at a significant disadvantage when compared to ERP solutions that were purely bred in the cloud, such as Plex Systems. However, SAP S/4 HANA and Oracle ERP Cloud are common choices in large companies, as they have the capacity to support the operations of large enterprises (Kimberling,

2019).

When comparing the two systems, SAP S/4 HANA can provide more standardised business processes than Oracle ERP Cloud. However, this standardisation tends to make S/4 HANA less flexible, and organisations may prefer to adopt Oracle ERP Cloud for its flexibility (Kimberling, 2019). SAP S/4 HANA is more flexible in terms of deployment options, as it allows users to deploy in the cloud or on-premise. This is a weakness of Oracle ERP Cloud, as it can only be deployed in the cloud. Oracle ERP Cloud has higher employee adoption, as it has a better user interface and more flexibility when compared to SAP S/4 HANA (Kimberling, 2019; Select Hub, 2020).

2) The disruption of SAP ERP ECC 6.0 and the introduction of SAP S/4 HANA

The focus of this study is on the adoption of the SAP S/4 HANA ERP system. In 2015, SAP launched SAP S/4 HANA, a product that runs solely on the SAP HANA database and incorporates a revolutionary user experience through the Fiori Launchpad and SAP user interface for HTML5 (UI5) applications. These applications make it easy for users to transact on any mobile device, which improves business user satisfaction and productivity (Deloitte, 2017). SAP S/4 HANA can also be integrated with advanced digital technologies and customers are encouraged to acquire the ERP system together with the advanced technologies in order to become an "intelligent enterprise" (SAP, 2020b).

The two excerpts below taken from the SAP website demonstrate the drive by SAP to encourage its customers to adopt intelligent ERP so that they can become intelligent enterprises:

"Embedding AI is fundamental to innovating business processes and deriving insights from data – in short, to competing in markets today. Equally important, employing other intelligent technologies such as IoT and predictive analytics, along with best practices consistently, are essential to understanding the environmental impact of your end-to-end operations, with sustainability at the core of everything you do" (SAP, 2020b)

The SAP website also states that "To become an Intelligent Enterprise, you need to run your most critical business processes with applications that work smoothly together, enabling end-to-end process planning, execution, and analytics infused with machine learning. These processes encompass all aspects of the customer journey, from lead generation to payment, from recruiting

to retirement, from product design through to operations, capturing all processes in manufacturing and the supply chain. Data is, of course, key – supporting intelligent processes with connectivity for all data types and sources in a trusted, scalable, governed environment." (SAP, 2020b)

Table 2.1 depicts the potential value addition that these technological synergies offer to SAP customers.

Table 2.1: Potential Benefits of SAP's Intelligent Innovations Adapted from (SAP, 2019b)

SAP Product	Potential benefits based on SAP customer use cases
SAP HANA	100x reduction in sales query execution time
SAP Cloud Platform	66% reduction in administrative work
SAP Analytics Cloud	200% increase in annual production capacity
SAP Leonardo Machine Learning	465 improvement in Accounts Receivable productivity
SAP Intelligent Robotic Process Automation	80% reduction in new customer on-boarding time
SAP Leonardo IoT Edge Services	+$2M cost reduction in maintenance processes

The benefits that come with the adoption of intelligent ERP solutions such as SAP S/4 HANA are undisputable. However, the financial commitment required to procure intelligent ERP systems is likely to be quite significant, especially in the case of customers based in developing countries such as South Africa. Even though the adoption of SAP S/4 HANA in the cloud will be cheaper than the traditional on-premise option from a maintenance perspective, there are still costs associated with the migration, which most customers might not be ready to incur (SAP, 2019a). Although SAP does not publish the costs of implementing SAP S/4 HANA, it is important to note that customers will still have to pay for license fees, training of users, customisations, data migration, testing and maintenance. These costs are significant and ERP implementation costs have been known to range anywhere between US $1 million and $10 million (Hutchison, 2015).

According to a United Nations Development Programme (UNDP) study on the impact of Covid-19 on the South African economy, the gross domestic product of South Africa is expected to reduce by as much as 7.9% as a result of the deadly disease (UNDP, 2020). The impact of this pandemic in the form of increased unemployment and reduced disposable income will cause most companies to re-evaluate their budgets, and in this case their information technology (IT) spend, as they are faced with navigating the tough terrain of lower turnover and reduced profits.

The initial maintenance deadline given by SAP in 2018 stated that all SAP customers should

migrate to SAP S/4 HANA by 2025. This deadline was subsequently extended by SAP in 2020 and customers have been advised to adopt SAP S/4 HANA by 2040. Those who choose not to adopt S/4 HANA by 2040 will have to pay significantly more for the continued maintenance of the SAP ECC 6.0 version (SAP Support, 2020). This ultimatum is a unique adoption factor that is of significance in the study of the adoption of this intelligent ERP solution.

2.3 Theoretical Underpinnings and Research Model

This section identifies and validates the use of existing theoretical frameworks, upon which the research model for this study will be established. Hypotheses have been proposed based on this research model.

2.3.1 The Technology–Organisation–Environment framework

The study of the adoption of innovations, such as the adoption of ERP technologies, can be framed using the technology-organisation-environment (TOE) framework, which is depicted in Figure 2.3. The TOE framework identifies the large influence that the context of an organisation has on the adoption and implementation of innovative technologies. The context is split into three aspects, namely the technological, organisational, and environmental contexts. The technological context relates to the technologies that are already in existence in the firm, as well as the existing technologies that have not been acquired and used by the firm. The organisational context refers to the descriptive characteristics of the organisation, such as firm size, internal communication processes, management structures and the firm's resources. Lastly, the environmental context relates to the arena in which a firm operates. This arena is made up of service providers, competitors and government regulations (Dwivedi et al., 2012).

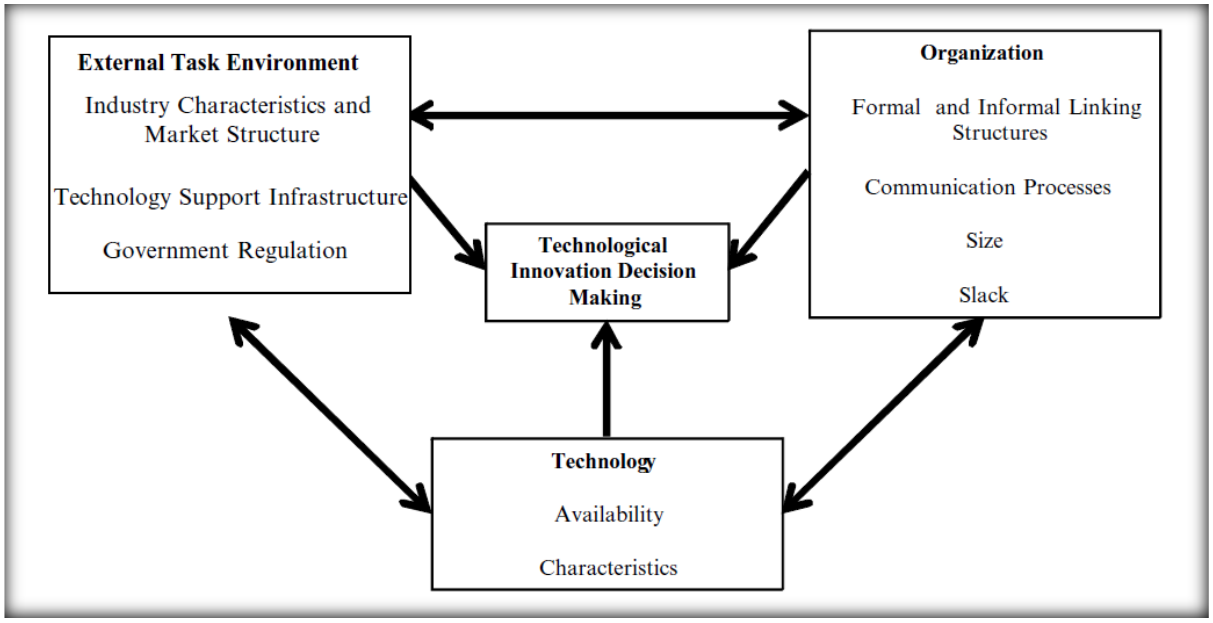


Figure 2.3: The TOE Framework (Dwivedi et al., 2012; Tornatzky & Fleischer, 1990)

The TOE framework has a solid theoretical basis and has gained much empirical support, as it is broadly applicable when it comes to technological adoption research studies. It has been used in various technological adoption studies. Specific to ERP adoption, Ramdani et al. (2009) found that large organisations that had a greater relative advantage, more ability to test systems before adoption, greater top management support and increased overall firm readiness were highly likely to adopt ERPs (Ramdani et al., 2009). Pan and Jang (2008) also found that factors such as the size, technology readiness of the organisation and any perceived barriers to adoption were significant factors in ERP adoption (Pan & Jang, 2008). This framework has also been classified as a generic framework, and the ability to add varying factors to the framework makes it very adaptable (Dwivedi et al., 2012; Zhu & Kraemer, 2005).

2.3.2 The Institutional Theory

The institutional theory posits that the environment of an institution is crucial in shaping the organisation's structure and action. The theory claims that over time, organisations will become more and more alike as they succumb to isomorphic pressure and the need for legitimacy in their industry (Oliveira & Martins, 2011). Institutional isomorphism is a result of organisations in a similar industry conforming to these pressures and eventually becoming similar to the leading firms in the industry (Liang et al., 2007).

Three types of institutional isomorphism identified by DiMaggio and Powell (1983) are coercive, mimetic and normative isomorphism. Mimetic pressures are seen when organisations imitate their

competitors in order to maintain legitimacy; for example, companies may implement software their competitors have implemented, to ensure that they remain relevant (Liang et al., 2007). Coercive pressures are forced on organisations by other organisations on which they depend (Liang et al., 2007). This can be seen where a customer will implement a system for electronic invoicing and request that all vendors implement systems and procedures that will ensure that the vendor invoice can be transmitted and seamlessly integrated into the client's ERP system. Normative pressures are exerted between firms that have mutual relationships, where there is sharing of information and standards (DiMaggio & Powell, 1983). These can be seen where ERP user groups, which are usually set up by ERP vendors, make a platform available for ERP customers to share their experiences and expectations regarding their ERP products. The inputs from the ERP user group sessions are usually acted upon and this might have an impact on other ERP customers.

The research model of this study is based on a combination of the TOE framework and the institutional theory. Prior technology adoption models have combined the TOE framework and the institutional theory (Gibbs & Kraemer, 2004; Soares & Palma-dos-Reis, 2008). The institutional theory sheds more light on the environmental context of the TOE framework by highlighting the pressure from vendors, customers, competitors and related stakeholders (Oliveira & Martins, 2011).

Several alternative theoretical models have been used in IS adoption studies. Some of these include the technology acceptance model (TAM), the theory of planned behaviour (TPB), the unified theory of acceptance and use of technology (UTAUT) and the diffusion of innovation theory (DOI) (Oliveira & Martins, 2011). The TAM, UTAUT and TPB models were discarded as frameworks for this study since these are frameworks that focus on the factors that affect the acceptance and assimilation of IS technologies by individuals in a firm, whereas this study focuses on adoption at organisational level.

The DOI theory is comparable to the TOE framework, as it is a firm-level framework that highlights the factors affecting IS adoption at organisation level. The DOI theory states that the rate at which an organisation innovates or adopts new technologies is influenced by three main factors, namely individual characteristics (i.e., the attitude of leaders to change), internal characteristics of the organisational culture (i.e., centralisation, complexity, formalisation, interconnectedness, organisational slack and size) and finally the external characteristics of the

organisation (i.e., system openness).

Even though the DOI theory is a solid theoretical framework, it was discarded as a theoretical foundation for this study, as it does not incorporate the environmental context as is found in the TOE framework. The environmental context of the TOE framework allows the research model to be more comprehensive than the DOI theory (Dwivedi et al., 2012; Oliveira & Martins, 2011).

2.3.3 Research Model

Given that the study sought to find out the factors that led organisations to adopt, or not to adopt intelligent ERPs, two models were developed, one for adopters and another model for non-adopters. In both models, nine variables were positioned within the TOE framework as predictors of intelligent ERP adoption. Three of these variables were derived from the institutional theory and positioned in the environmental context of the TOE model. These predictors are technological (information and communication technology (ICT) infrastructure, technical skills, and cyber-security), organisational (organisational size, top management support) and environmental (government regulations and three factors from the institutional theory, namely coercive forces, normative pressure and mimetic pressure). Adoption of intelligent ERP was positioned as the dependent variable in both models for adopters and non-adopters. Based on the research model depicted in Figure 2.4 and the findings from the literature review in section 2.2, nine hypotheses were proposed in the technological, organisational, and environmental contexts.

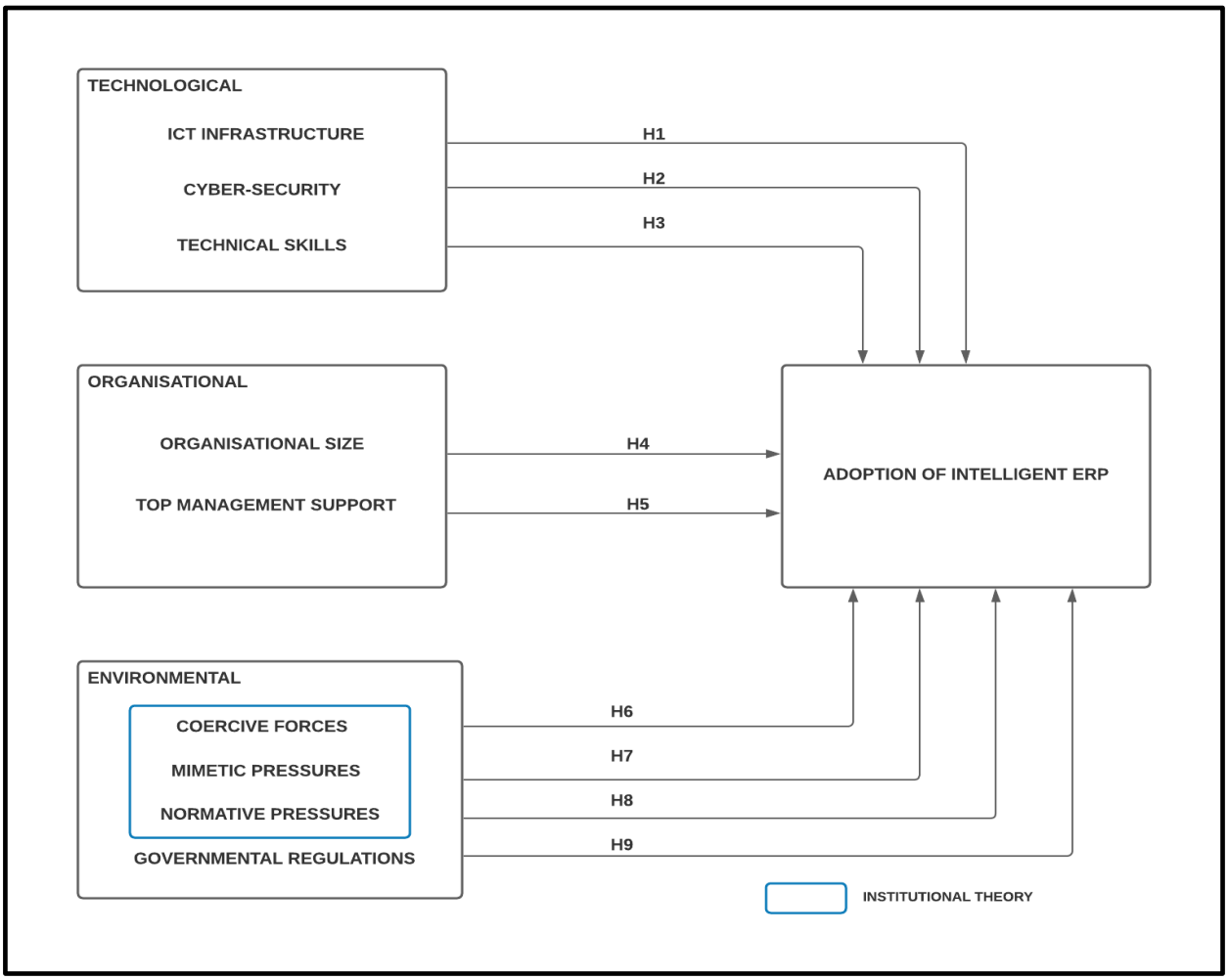


Figure 2.4: Research Model

1) Technological Context

Information and communication technology infrastructure

A key component of an organisation's technological capabilities lies in the ICT infrastructure that is available to the organisation (Deloitte, 2017). Most organisations in developing countries are running on old and outdated equipment and infrastructure, as the cost of replacing these machines might be out of the reach of most. This infrastructure is highly unlikely to be suitable for the use of technologies that have been incorporated in SAP S/4 HANA, such as IoT technologies (Bayode, 2019). The situation in South Africa may, however, be more favourable for the implementation of intelligent ERP than in other developing countries, as Communications Minister Stella Ndabeni-Adams noted that "It is important to acknowledge that South Africa is not starting from a zero base, as various elements of 4IR are already being implemented across the country" (Ndabeni-Williams, 2019).

Hypothesis 1. Access to ICT infrastructure is positively related to intelligent ERP adoption.

Cybersecurity systems

The threat of cyber-attacks and data breaches is a significant hindrance to organisations that may be considering the adoption of intelligent ERP systems that are hosted in the cloud (Bayode, 2019). ERP systems such as SAP S/4 HANA can be deployed on-premise or in the cloud, i.e., the software as a service option. Although this option is cheaper and more accessible to most organisations, issues of data privacy and data security are of great concern to them. The Protection of Personal Information Act and the General Data Protection Regulation regulations in Europe add complexity to how customer data should be stored and managed, which raises fears in organisations about their data policies and exposure to risk (Pazvakavambwa, 2017; Slokenberga et al., 2019). Organisations that have confidence in the available cyber-security systems have been found to be more willing to adopt online technologies (Awa et al., 2016; Belkhamza & Wafa, 2009). This is, however, contradicted by some researchers who have found no relationship between security concerns and technology adoption (Yoon & George, 2013).

Hypothesis 2. The availability of cyber-security systems is positively related to intelligent ERP adoption.

Availability of technical skills

Prior research has indicated that organisations that have strong technological capabilities are more likely to adopt new technologies. The availability of professionals who have the knowledge and skills to implement and support complex solutions has been proven to have a positive impact on the adoption of IT solutions such as intelligent ERP solutions (Awa et al., 2016; Pan & Jang, 2008; Zhu & Kraemer, 2005). An organisation needs to consider the availability of internal and external human resources that will be able to use and support the new ERP technologies. This is even more critical for ERP systems in the digital economy where the ERP systems are integrated with next generation technologies. These skills are scarce and costly in developing economies and this may hinder the adoption of ERP versions such as SAP's S/4 HANA (Hartlett, 2020).

Hypothesis 3. The availability of technical skills is positively related to intelligent ERP adoption.

2) Organisational Context

Organisational size

Large organisations have been shown to be able to adopt new technologies readily, owing to their

financial muscle, flexibility and greater cushioning against risks (Shehab et al., 2004; Zhu & Kraemer, 2005). However, researchers such as Damanpour (1996) highlighted that the sheer size of some organisations leads to structural inertia, which can hinder the adoption of new technologies (Damanpour, 1996). Armstrong and Sambamurthy (1999) also found no relationship between organisational size and IT adoption.

Hypothesis 4. The size of an organisation is positively related to intelligent ERP adoption.

Top management support

Another organisational factor that has been shown to have an influence on technology adoption is top management support. Several studies have shown that top management's support is critical to overcoming the barriers to ERP technology adoption (Dong & Neufeld, 2009; Mir, 2014). Where new technologies are introduced, it is common for employees to resist the adoption of the new technology. Top management is able to influence how the new technology is perceived in the organisation and also to channel relevant resources towards the successful implementation of the new technology (Kinuthia, 2015).

Hypothesis 5. Top management support is positively related to intelligent ERP adoption.

3) Environmental Context

Coercive forces

Coercive forces in a firm's operating environment can be seen when stakeholders on which the firm is dependent put pressure on the organisation to make decisions concerning their technologies. This might be seen when vendors such as SAP give support deadlines to their customers to encourage them to embrace new releases of their ERP offerings. This may also occur where other players in the supply chain adopt new technologies, which they then push other organisations in the supply chain to adopt. Coercive forces have been shown in previous studies to have an impact on an organisation's technology decisions (DiMaggio & Powell, 1983; Liang et al., 2007). Possibly one of the largest push factors for SAP's customers to move on to SAP S/4 HANA was that in 2018, SAP announced that it would be ending maintenance of all ECC 6.0 instances of SAP at the end of December 2025 (ASUG, 2018). This announcement undoubtedly put immense financial pressure on organisations that might not have been ready to migrate to S/4 HANA. After a significantly low adoption rate of the new ERP version, SAP eventually eased this ultimatum in February 2020 by extending the support for ECC 6.0 to 2027, with optional maintenance being available at additional cost until 2030 (SAP, 2020a). This extension offers little

relief to organisations in developing countries, where financial and skilled human resources are scarce.

Hypothesis 6. Coercive forces are positively related to intelligent ERP adoption.

Mimetic pressures

Mimetic pressures are seen where organisations adopt an innovation as an act of imitating competitors (Oliveira & Martins, 2011). Mimetic or competitive pressure has been shown to be a main driver of technology adoption (Awa et al., 2016; Porter & Millar, 1985). In a study of 56 respondents, it was found that 71% of the respondents confirmed that they had adopted ERP as a result of copying trends in their particular industry (Wood & Caldas, 2001).

Hypothesis 7. Mimetic pressure is positively related to intelligent ERP adoption.

Normative pressures

Normative pressures exerted by customers, ERP vendors, professional associations and other trading partners have been shown to influence ERP adoption. For example, organisations might be inundated with messages from ERP vendors on how peer organisations in their industries have adopted the technology. This will potentially influence an organisation's decision to adopt the new technologies (Awa et al., 2017; Liang et al., 2007). In the context of migration to SAP S/4 HANA, user groups such as the African SAP User Group (AFSUG) are instrumental in sharing the user experiences of companies that have successfully adopted SAP S/4 HANA with those customers who are still to adopt the intelligent ERP solution (AFSUG, 2020).

Hypothesis 8. Normative pressure is positively related to intelligent ERP adoption.

Government regulations

Regulations frame the environment in which organisations conduct their business. Some regulations could potentially influence an organisation's willingness to adopt new ERP technologies. These include regulations on data privacy, control of carbon emissions, patenting and licensing, as well as accounting standards (Dwivedi et al., 2012). Organisations are more likely to adopt technologies where there are clear policies and regulations set out by governing authorities. It is therefore crucial to have regulations that encourage and do not hinder the adoption of new technologies (Ahn & Ahn, 2020).

Hypothesis 9. Increased regulations are positively related to intelligent ERP adoption.

The above hypotheses are summarised in Table 2.2 below:

Table 2.2: Summary of Proposed Hypotheses

TOE	Hypothesis
Technological	***H1- Access to ICT infrastructure is positively related to intelligent ERP adoption.*** ***H2- The availability of cyber-security systems is positively related to intelligent ERP adoption.*** ***H3- The availability of technical skills is positively related to intelligent ERP adoption.***
Organisational	***H4- The size of an organisation is positively related to intelligent ERP adoption.*** ***H5- Top management support is positively related to intelligent ERP adoption.***
Environmental	***H6- Coercive forces are positively related to intelligent ERP adoption.*** ***H7- Mimetic pressure is positively related to intelligent ERP adoption.*** ***H8- Normative pressure is positively related to intelligent ERP adoption.*** ***H9- Increased regulations are positively related to intelligent ERP adoption.***

2.4 Summary of Literature Review

The literature review above lays the foundation upon which this study was conducted. The influence of the digital economy on ERP technologies has been discussed in detail. More importantly, the factors that affect ERP adoption derived from existing academic studies have been discussed in the context of the TOE framework. The findings from the existing literature do not address the research questions sufficiently and the following gaps have been identified:

1. Most existing studies have focused on the adoption of traditional ERPs and there is insufficient literature on the adoption of intelligent ERP in the context of the digital economy.
2. There is a need for more studies that are based on migration to intelligent ERPs in the context of developing countries such as South Africa.

This study will help to address these gaps by shedding light on the factors that influence intelligent ERP migrations in a South African context.

3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter will shed light on the research methodology that was followed in this study. The reasons for conducting the research under a positivist paradigm will be explained and justification for why a correlational research design was chosen for this study will also be given. The questionnaire that was used for the survey will be discussed in detail, specifically how it links to the constructs of the research model. This chapter also sheds light on the sample, sampling strategy, and the nature of respondents chosen to complete the survey. A description of the data analysis strategy and chosen statistical analysis techniques will also be given. Finally, the ethical aspects that guided the study will be discussed.

3.2 Research Paradigm

A research paradigm can be defined as "a basic system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways" (Lincoln & Guba, 1985, p. 105). IS research is classified as positivist if quantifiable measures of variables, formal propositions, hypothesis testing and the drawing of inferences are applied (Orlikowski & Baroudi, 1991). To address the main research question of this study, the researcher believes that a positivist approach is most suitable. Using the TOE framework and the institutional theory as basis, the research model enabled the researcher to measure specific variables, test a set of hypotheses and draw inferences regarding the factors that influence intelligent ERP adoption. Similar studies on technology adoption have been conducted within a positivist paradigm (Awa et al., 2016; Poba-Nzaou et al., 2008).

Ontology is concerned with the essence of the particular social aspect that is being studied (Cohen et al., 2007). The ontology of positivism is realism and positivist researchers believe that natural laws determine the reality that we see (Lincoln & Guba, 1985). Positivists believe that social reality exists independently of the observer, and that it is possible to measure and study reality without the influence of the researcher (Shah et al., 2013). The researcher believes that the phenomenon of intelligent ERP adoption is one that can be isolated from the influence of the researcher, as it exists independently of the researcher.

Epistemology is concerned with the fundamental aspects of knowledge, such as its various forms, as well as how it is accumulated and communicated to and between human beings (Cohen et al., 2007). The epistemology of positivism is objectivist and dualistic (Lincoln & Guba, 1985).

Positivist research is based on the belief that one can separate researchers from the phenomenon that they are observing (Weber, 2004). Researchers' role is limited to observation only, and they cannot interfere as in the case of the interpretivist approach (Cohen et al., 2007). The researcher believes that intelligent ERP is a phenomenon that is separate from the researcher and therefore the study can be conducted objectively by the researcher.

3.3 Research Design and Methodology

Given the nature of the research questions and the position taken that this study would follow a positivist approach, a correlational research design was regarded as the most suitable research design for this project. Correlational research focuses on observing two variables to determine if there is a statistically corresponding relationship between the two variables. The aim is to identify variables that have some kind of relationship so that a change in one variable leads to a change in the other (Chiang et al., 2015). In this study, the variables that have been placed within the TOE framework are the nine independent variables, and the adoption of intelligent ERP is the dependent variable in the relationship.

The research strategy that was employed in this study is the survey and an online questionnaire was used as the data collection instrument for the survey. According to Bhattacherjee (2012), surveys are a research method that makes use of questionnaires or interviews as data collection tools. These tools enable a researcher to collate data that concerns human thought, preference and behaviour using a structured approach. The survey has been employed in similar academic research papers (Awa et al., 2017; Pan & Jang, 2008; Yoon & George, 2013) and was chosen as a suitable research strategy, as it allows the researcher to reach a wider and more inclusive set of respondents, which makes the results more generalisable to a wider population. The survey method also allows results to be collated in a faster and more cost-effective way, compared to other research methods (Oates, 2005).

Operationalisation/measurement and instrument construction

The purpose of this study was to ascertain the factors that influence the adoption of intelligent ERPs such as SAP S/4 HANA. A questionnaire to investigate the relationship between the nine independent variables and the dependent variable of intelligent ERP adoption was developed based on the TOE research model (Figure 2.4).

The questionnaire was divided into four main sections. An introductory section introduced

the researcher and the purpose of the questionnaire. In this section the respondent was also advised that the data collection was voluntary, confidential, and anonymous.

Section 1 of the questionnaire (Questions 1-5) was completed by all respondents. This section was dedicated to gathering information such as the job title of respondents, the size of their organisation and the industry within which the organisation operates. Questions 4 and 5 asked the respondents whether their organisations ran on SAP and specifically whether their organisations had adopted SAP S/4 HANA. Depending on the response to question 5, which indicated if the respondent's organisation had adopted SAP S/4 HANA or not, respondents were routed to Section 2a (Questions 6-28) for SAP S/4 HANA adopters or Section 2b (Questions 6-28) for SAP S/4 HANA non-adopters. The respondents were asked to rate their perceptions of the proposed factors that affect intelligent ERP adoption on a seven-point Likert scale. A seven-point Likert scale is recommended for questionnaires, as it elicits more accurate responses when compared to binary scales. The seven-point Likert scale also allows respondents with a neutral position on any item on the questionnaire to record their neutral stance (Bhattacherjee, 2012).

The constructs of this study have been thoroughly researched in literature and have been demonstrated to have content validity. Content validity assesses whether the scale is representative of all aspects of the construct that it seeks to measure (Bhattacherjee, 2012). Construct validity, on the other hand, determines how well a given scale is measuring the construct that it is expected to measure (Bhattacherjee, 2012).

The measures for the constructs have been derived from previous academic literature and these are depicted in Table 3.1 below.

Table 3.1: Operationalisation Of Constructs

Construct	Sources	Number of items measuring the construct	Question number (Adopters)	Question number (Non-adopters)	Sample question/statement
Adoption of intelligent ERP	Pan & Jang, 2008; Yoon & George, 2013)	3	4, 5, 6	5, 6, 7	Does your organisation run SAP?
ICT infrastructure	Pan & Jang, 2008; Zhu & Kraemer, 2005	2	7, 8	8, 9	SAP S/4 HANA was easily compatible with the organisation's existing ICT infrastructure.
Cyber security	Awa et al., 2016; Yoon & George, 2013	3	9, 10, 11	10, 11, 12	SAP S/4 HANA's security environment gave the organisation the confidence to migrate to SAP S/4 HANA.
Technical skills	Awa et al., 2016; Zhu & Kraemer, 2005	2	12,13	13, 14	There is sufficient availability of local certified SAP implementation partners/consultants to implement and support SAP S/4 HANA.
Organisational size	Ramdani et al., 2009; Yoon & George, 2013	1	3	3	How many people are in your organisation?
Top management support	Ramdani et al., 2009; Soliman & Janz, 2004	4	15, 16, 17, 18	15, 16, 17, 18	The organisation's top management aggressively invests funds in new information technologies.
Coercive forces	Yoon & George, 2013	2	19, 20	19, 20	There were customers that expected the

					organisation to migrate to SAP S/4 HANA.
Mimetic forces	Awa et al., 2017; Yoon & George, 2013	2	21, 22	21, 22	The organisation could have lost customers if it had not adopted SAP S/4 HANA.
Normative pressures	Awa et al., 2017	3	23, 24, 25	23, 24, 25	The organisation was encouraged by SAP user groupings to adopt SAP S/4 HANA.
Governmental regulations	Pan & Jang, 2008; Zhu & Kraemer, 2005	3	26, 27, 28	26, 27, 28	The organisation was hesitant to adopt SAP S/4 HANA in the cloud owing to restrictive governmental policies e.g., data privacy and security laws.

The questionnaire ended by thanking the respondents for their participation. A copy of the questionnaire is attached as Appendix A.

3.4 Sampling

Non-probabilistic purposive sampling was used as the sampling method in this study. This method is used where a researcher will purposefully select a sample that will produce valuable data to meet the needs of the study (Oates, 2005). The researcher in this study purposefully targeted employees who work for South African-based organisations that run on SAP ERP as the sample for this study. SAP does not divulge its customer information; however, according to an IT Web report on SAP S/4 HANA migrations in South Africa, SAP has 900 clients in South Africa (Hartlett, 2020).

The sample was made up of 95 South African SAP customer organisations. The link to the survey was sent via the professional networking platform, LinkedIn, to four employees from each of these 95 organisations. The targeted organisations were of varying sizes and they operated across multiple industries. Employees with job titles such as chief information officer, chief technology officer, business integration manager, information technology manager, information security consultant, SAP consultant, and SAP systems support consultant were targeted as respondents to

this questionnaire. Employees with job titles similar to the above were selected as potential respondents, as they could have insights and influence on the company's decision to adopt intelligent ERP.

3.5 Pre-Test and Pilot Test

The questionnaire was reviewed by an academic who is knowledgeable in ERP systems to ensure that the survey items captured the essence of the constructs being operationalised. The academic also checked the layout of the questionnaire, to ensure that the wording and sequence of the items in the questionnaire were easy to follow. Having received feedback on the pre-test of the questionnaire, the researcher made the necessary adjustments, and the survey was deployed for pilot testing.

The online questionnaire was pilot tested by two IS professionals to ensure that the items were interpreted properly. The pilot test was successful, and the testers confirmed that they had been able to complete the questionnaire with ease and there was no ambiguity in the questions.

3.6 Administration of the Instrument

There are several ways in which data can be collected from respondents in a survey. These methods include postal and telephonic surveys, face-to-face surveys as well as online surveys (Oates, 2005). Given the fact that the companies in the sample were based all over South Africa, it was not feasible to carry out face-to-face interviews and this situation was exacerbated by lockdown restrictions in the nation. Postal and telephonic surveys were rejected as an option, as these would have cost a significant amount of money and delayed the results of the study, given the size of the sample.

An online questionnaire was chosen as the data collection tool for this study. The online questionnaire was suitable for this study as it helped reduce researcher bias by soliciting input from the respondents without researcher interference. The online questionnaire also gave the respondents freedom to answer freely, as they would not feel under pressure to answer questions in a certain way, which might be the case with interviews or focus groups (Bhattacherjee, 2012; Oates, 2005).

The questionnaire for this study was designed using an online website called "QuestionPro". The link to the online questionnaire was sent to potential respondents to whom the researcher introduced herself on the professional network website, LinkedIn. The researcher sent a short introductory message to the respondents, introducing herself and stating the purpose of the study. The respondents were then able to click on the link to the questionnaire where more detail on the questionnaire was available. This included ethical details on anonymity, confidentiality, and privacy. This method of reaching out to the professionals was chosen as it helped to gain access to the potential respondents in a relatively short time. It also helped build professional relationships, as some respondents were able to continue conversing with the researcher and give valuable input and comments on the study even after filling out the questionnaire.

3.7 Data Analysis Strategy

3.7.1 Descriptive statistics

The data that was collected from the survey was analysed using the Statistical Package for Social Sciences (SPSS). The data collected from the first section of the questionnaire relates to the demographic information of the respondents and the organisations that they represent. This data included the respondents' job title, the size of the organisation and the industry within which the organisation operates. The second section determined if the respondents' organisation had adopted SAP S/4 HANA or not. Those that had adopted SAP S/4 HANA were required to confirm the deployment option that their organisation had chosen for the intelligent ERP. The non-adopters were required to confirm if their company had plans to migrate to SAP S/4 HANA and to indicate the timelines within which they anticipated that they would migrate to SAP S/4 HANA. The results from these two sections were summarised and depicted in bar graphs and pie charts.

The main section of the questionnaire was based on a seven-point Likert scale, where statements were made on the factors that potentially have an influence on intelligent ERP adoption. The respondents were asked to respond to these statements based on their perception of the technological, organisational, and environmental factors proposed in the research model; 1 represented strong disagreement with the statement and 7 represented strong agreement with the statement on intelligent ERP adoption in their organisation.

3.7.2 Data Cleaning and Preparation

The collected data was screened to identify any missing data from the responses. The standard deviation shows the deviation from the mean. Any responses that were outliers were identified as responses that were more than three standard deviations from the mean. This is a common method for outlier detection and is called the #-sigma rule, where '#' is a place holder that represents the number of standard deviations from the mean (Zwilling, 2017).

3.7.3 Validity

It is important that the measures of the research model demonstrate construct validity. Validity is the extent to which a measure adequately represents the construct that it measures (Bhattacherjee, 2012). The literature review conducted to determine how other researchers had operationalised similar constructs, as well as pilot tests, were means of confirming construct validity. A more

scientific method of confirming validity is factor analysis. Factor analysis is used to determine convergent validity in multi-item scales. Convergent validity involves measuring a construct with independent measurement techniques and demonstrating high correlation among the measures (Mello & Collins, 2001). Using the principal component method in SPSS, exploratory factor analysis was conducted on the scales of this study. The extracted factors should ideally correspond to the underlying theoretical constructs under consideration. It is generally accepted that each extracted factor should have an eigenvalue greater than 1.0 (Bhattacherjee, 2012).

3.7.4 Reliability

The reliability of the measurement scales was tested using SPSS. Scale reliability was tested by determining the Cronbach Alpha's internal consistency coefficient. A Cronbach's alpha value of 0.7 is the generally accepted threshold for a scale reliability test (Cortina, 1993).This test was conducted on the nine independent variables of the research model.

3.7.5 Hypothesis Testing

The structural equation modelling (SEM) technique was used to test the relationship between the dependent variable of intelligent ERP adoption and the various independent variables placed within the TOE framework. A significance level of $p<0.05$ will be used to measure the significance of the relationship between the independent variables and the dependent variable. This technique was selected as it allows the researcher to model the relationships between multiple independent and dependent constructs simultaneously and also evaluates the loadings of observed measurements on the constructs (Gefen et al., 2000). This model has an advantage over traditional regression models such as linear regression, which only analyses one layer of linkages between the dependent and independent variables at a time (Gefen et al., 2000).

3.8 Ethical Considerations

The proposal and questionnaire went through the school ethics committee for approval before data collection commenced. Approval by the school ethics committee was received and issued under protocol certificate number CBUSE/1596. The researcher considered the following ethical issues raised by Miles and Huberman (1994) before, during and after the research process: informed consent, honesty and trust, privacy, confidentiality and anonymity (Miles & Huberman, 1994).

3.8.1 Informed consent, voluntary participation and right to withdraw

The researcher informed the participants of the nature, purpose, and data collection methods of the study. Consent was obtained from all participants prior to their participation in the study by giving them the option to withdraw from the study, should they not wish to participate. Participants were made aware that the research was for academic purposes and that their participation was voluntary. The researcher followed all the ethical guidelines that govern data collection and analysis.

3.8.2 Confidentiality, anonymity, and privacy

The researcher ensured that all responses were kept confidential by not requesting the names of the respondents to be entered on the questionnaire. The anonymity of the participants and their organisations would therefore be guaranteed when the findings of the study were presented.

3.9 Conclusion

This chapter gave an outline of the research methodology that was followed in this study. Justification for conducting the research under a positivist paradigm was given, as well as justification for choosing a correlational research design. The questionnaire that was used for the survey and the operationalisation of constructs was discussed in detail. The sample, sampling strategy and a summary of the information on respondents were also outlined in this chapter. The data analysis strategy and statistical analysis techniques that were used in the study were discussed in this chapter and the ethical aspects that guided the study were outlined.

4. DATA ANALYSIS

4.1 Introduction

This chapter looks at the data analysis of the constructs that constitute the research model of the study. Summary statistics are firstly presented for each of the factor components under each construct. This is followed by running a test of external validity. This test checks the appropriateness of using principal components analysis or factor analysis, given the data that was collected. The Bartlett test and the Kaiser-Meyer-Olkin (KMO) measure were used to test external validity. The reliability of the scale was conducted using the Cronbach's alpha test. Finally, SEM was used to test the hypotheses proposed for the research model. The SEM was also verified using several tests of fitness.

4.2 Sample Demographics

A list of 95 companies that run on SAP was compiled by the researcher and four potential respondents from each company were selected to participate in the study. The link to the survey was therefore sent out to 380 potential respondents.

The dashboard in Figure 4.1 shows the graphical representation of the response and completion statistics of the study. Of the 380 respondents, 306 people clicked the link to the survey, 135 people started the survey, and 98 people completed the survey. This gives a response rate of 72.59%, but a small completion rate of 25.79% overall. This is quite a low completion rate, which can be declared a limitation of this study.

The data was collected using an online tool known as QuestionPro. The data was exported to Microsoft Excel before being exported to SPSS for the final analysis. Of the 98 respondents who completed the survey, 89 confirmed that their organisation ran on SAP ERP software. Of these 89, only 84 respondents knew whether their organisation had adopted SAP S/4 HANA. The data of these 84 respondents was kept as the final dataset for analysis.

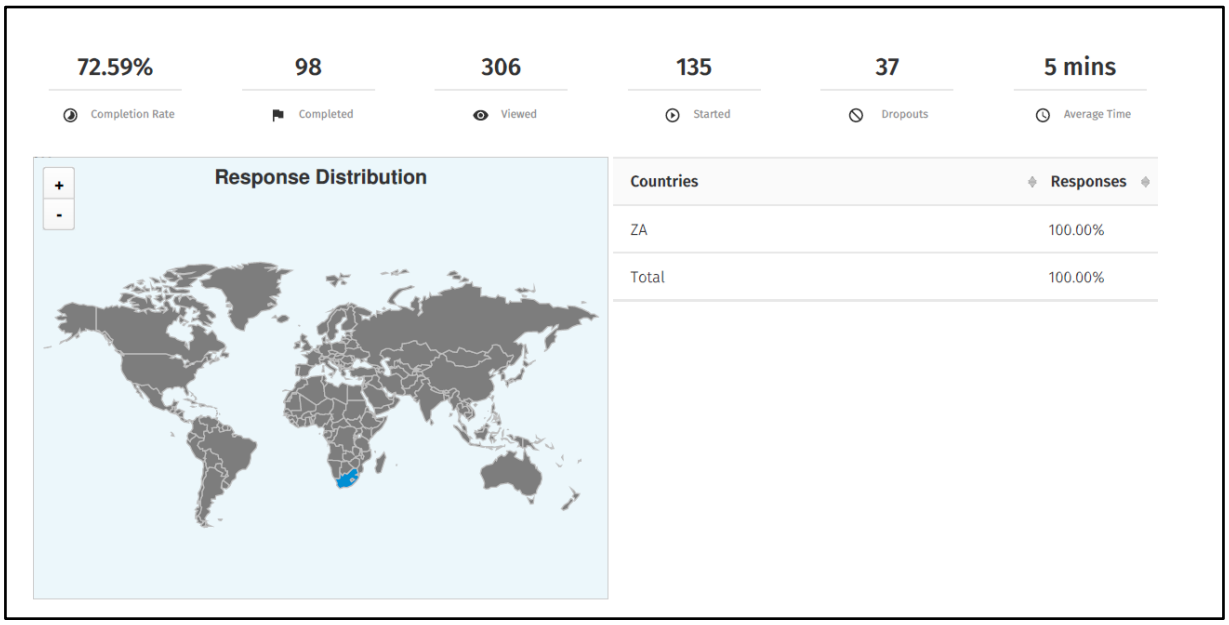


Figure 4.1: Response Rates

4.2.1 Data cleansing - Missing values and outlier detection

There were instances where respondents did not answer every question in the questionnaire. This could distort the results of the data analysis. Of the 84 responses that were obtained, only eight had missing values for some of the questions. To retain the size of the sample, the mean substitution method was used to substitute the missing values.

No extreme values were detected, hence there was no need to remove outliers. All 84 responses were retained for further analysis.

4.2.2 Job titles of respondents

Eighty-four respondents completed the questionnaire. As shown in figure 4.2, thirty-three per cent of the respondents were on middle management to senior management level and 67% of the respondents were IT specialists from different domains. The career levels are divided into senior management (e.g., chief information officers, heads of IT and group executives of IT), management (e.g., general managers, project managers and IT managers), as well as specialists (e.g., SAP functional consultants, SAP technical consultants, IT security specialists and data specialists). The researcher would have preferred to get more responses from senior management, but this did not happen, probably because of the busy schedules of senior executives, who could potentially have delegated the responsibility of completing the questionnaire to middle level

managers or IT specialists.

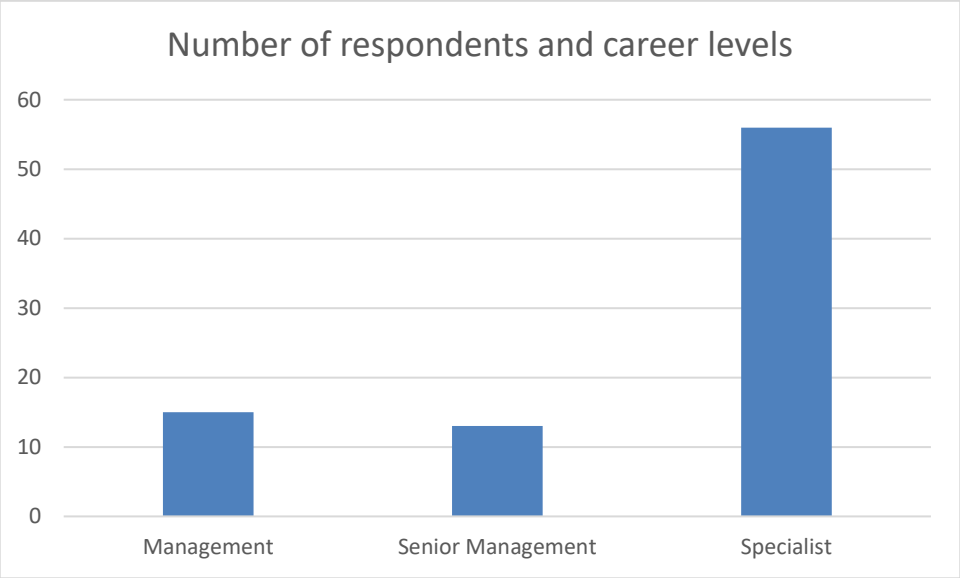


Figure 4.2: Number of Respondents and Career Levels

4.2.3 Industrial distribution

Figure 4.3 shows the industrial distribution of the organisations represented by the respondents in the data sample. Most respondents were employees of organisations in the ICT industry, followed by those from manufacturing. Transport and electricity, gas and water were the least represented industries, contributing only two and three respondents respectively. Some of the sectors that fell in the "Others" section were in the public sector and the logistics as well as oil and gas industries. The representation of respondents from various industries helped to make the findings of the data more generalisable to South African SAP ERP customers.

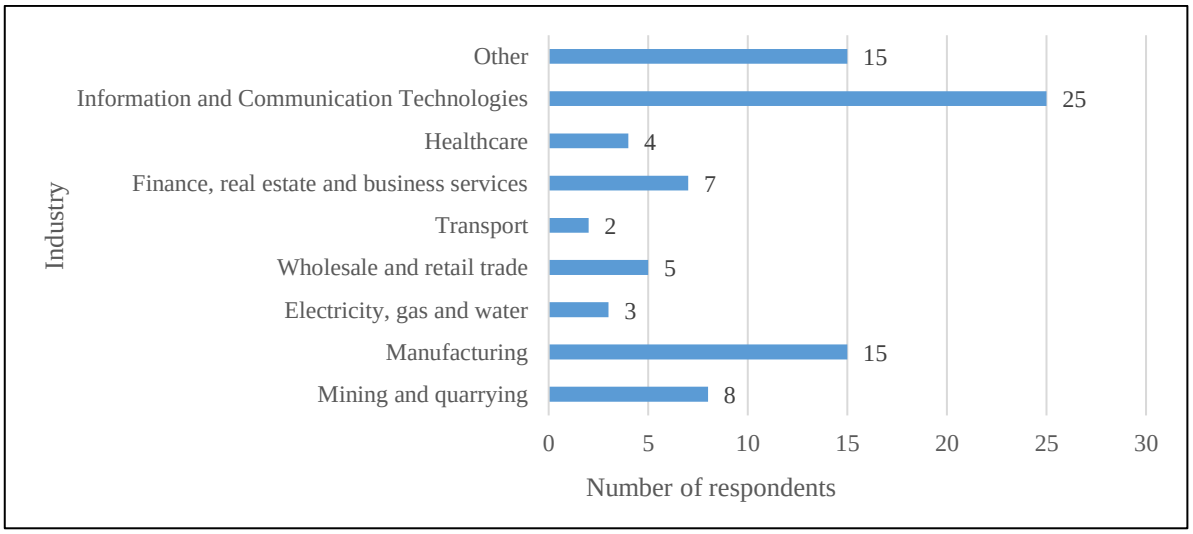


Figure 4.3: Industrial Distribution

4.2.4 Organisational size

Most of the respondents in the data sample were employees of large enterprises. Figure 4.4 below shows the size of the firms in the sample, using the number of people in each firm. Thirty-three respondents represented firms with more than 10 000 employees and 25 came from firms with an employee base of between 1 001 and 5 000 people. Only three respondents were employed by firms that had between 1 and 50 employees.

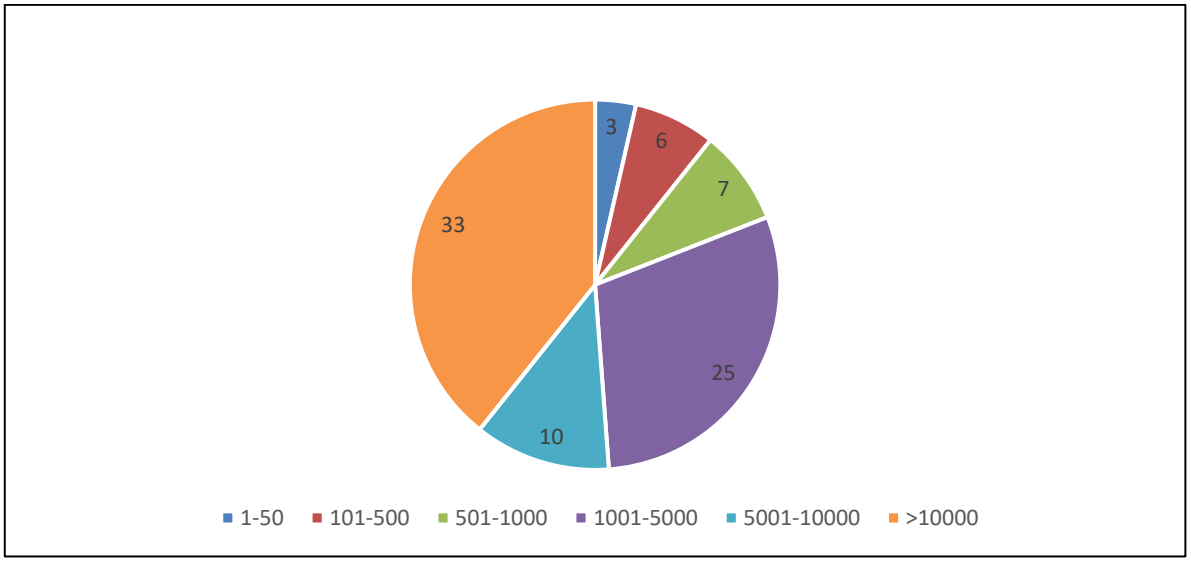


Figure 4.4: Organisational Size

4.2.5 SAP S/4 HANA Adoption

Figure 4.5 shows depicts that, of the 84 respondents who completed the survey, 22 confirmed that their organisations had adopted SAP S/4 HANA and 62 stated that their organisations were still on SAP ECC 6.0. This translates to an SAP S/4 HANA adoption rate of 26% and 74% non-adopters.

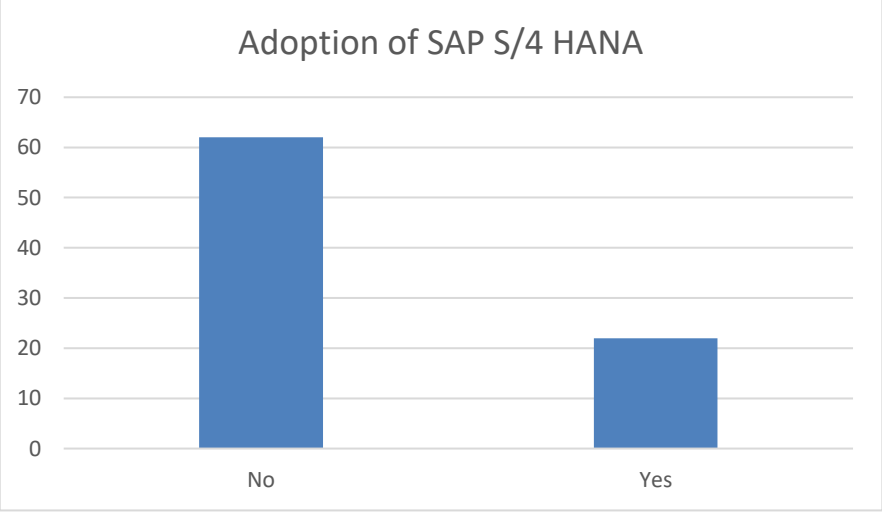


Figure *4.5*: SAP S/4 HANA Adoption Rate

Representatives from firms that had adopted SAP S/4 HANA were asked to confirm their organisations' SAP S/4 HANA deployment option. Customers had a choice to deploy the solution on-premise (SAP S/4HANA AnyPremise), as a private or public cloud tenant (SAP S/4HANA Cloud extended edition or SAP S/4HANA Cloud essentials edition), or to use a deployment that was a combination of on-premise and cloud options (SAP S/4HANA AnyPremise) (Hoque, 2019). Figure 4.6 shows that ten of the 22 respondents confirmed that their firms had deployed the solution on-premise, nine chose the hybrid option and only three chose to have their intelligent ERP solution hosted in the cloud. This showed that most organisations were not yet comfortable with deploying their ERP solution in the cloud and would rather have their ERP solution on-premise.

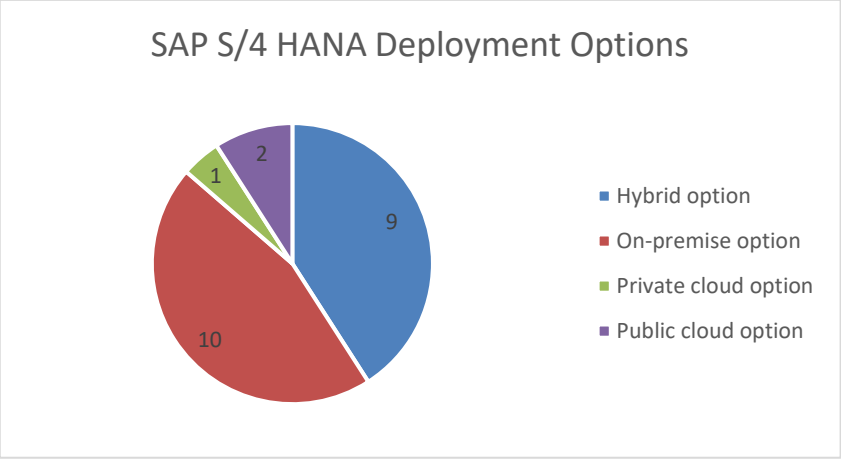


Figure 4.6: SAP S/4 HANA Deployment Options

Figure 4.7 depicts that a small proportion (20%) of the respondents whose firms had not yet adopted SAP S/4 HANA anticipated that their firms would adopt the intelligent ERP solution within the next year. A combined total of 66% anticipated that their organisations would only adopt the solution in the next 12-18 months, 18-24 months and longer than 24 months brackets. Five percent of the respondents reported that their organisations had no plan to migrate to SAP S/4 HANA. This showed that most of the organisations were not yet ready to make the move to SAP S/4 HANA and might still need to consider various factors before they migrated to SAP S/4 HANA.

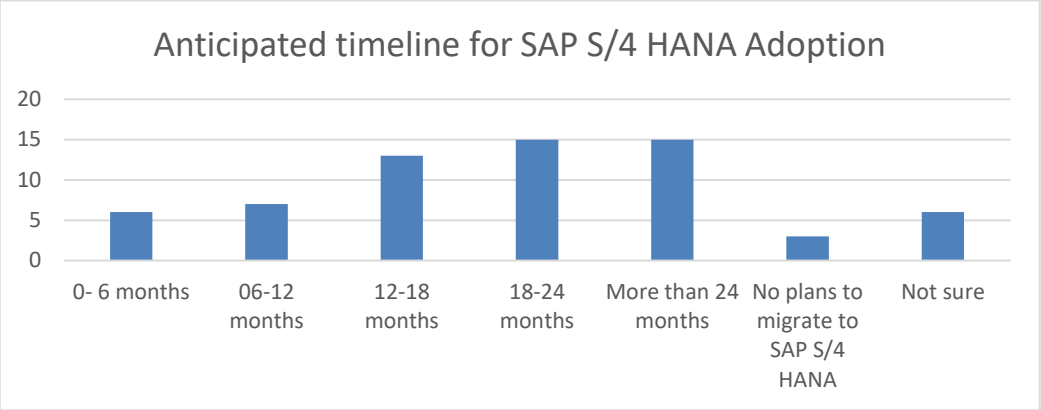


Figure *4.7*: Timeline For SAP S/4 HANA Adoption

4.3 Summary Statistics

Table 4.1 shows the summary statistics of all the components under each construct. The questions that belong to the same construct are grouped together. Each component under a single construct is uniquely identified by the question number. The table displays the observations column, which shows the sample size under each component. The maximum sample size is 84 but some components have fewer than 84, as some respondents did not answer selective questions from the questionnaire.

The mean column in Table 4.1 shows the statistic mean of each construct. The mean or the arithmetic mean is simply the average of the values in each construct. It is normally used to show the central tendency of statistics but can be affected by outliers, thus it is not a robust measure of central tendencies. *Q3 Organisational size* and *Q10 Cyber-security* had the highest mean of 5.536 and 5.537, while *Adopters of S/4 HANA* had the lowest mean of 0.238. The variable *Adopters of S/4 HANA* depicts the firms that had already adopted SAP's intelligent ERP and those that were yet to adopt SAP S/4 HANA. A value of 1 is assigned to the adopters and a value of 0 is given to non-adopters.

The standard deviation is also displayed in the summary statistics table. The standard deviation measures the amount of dispersion in the dataset; in other words, it depicts the deviation from the mean of the dataset. A low standard deviation indicates that the values tend to be close to the mean of the set, while a high standard deviation indicates that the values are spread out (Bhattacherjee, 2012). The standard deviations are all relatively low, with the highest standard deviation of 1.993 being recorded for the variable *Q26 Governmental regulations*. The last two columns of Table 4.1 show the minimum values and the maximum values recorded for each

variable. All the constructs for the independent variables, except for organisational size, were linked to a seven-point Likert scale, which had response options ranging from 1- Strongly disagree to 7- Strongly agree.

Table 4.1: Summary Statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Adopters of S/4 HANA	84	0.238	0.429	0	1
Q3 Organisational size	84	5.536	1.540	1	7
Q7 ICT infrastructure	84	4.550	1.791	1	7
Q8 ICT infrastructure	84	5.036	1.663	1	7
Q9 Cyber-security	84	5.193	1.619	1	7
Q10 Cyber-security	83	5.537	1.269	2	7
Q11 Cyber-security	83	5.524	1.178	2	7
Q12 Technical skills	84	5.229	1.517	1	7
Q13 Technical skills	84	5.133	1.846	1	7
Q15 Top management support	83	4.854	1.736	1	7
Q16 Top management support	84	5.012	1.510	1	7
Q17 Top management support	84	5.217	1.668	1	7
Q18 Top management support	83	5.061	1.643	1	7
Q19 Coercive forces	83	3.744	1.904	1	7
Q20 Coercive forces	84	3.518	1.889	1	7
Q21 Mimetic forces	84	2.663	1.734	1	7
Q22 Mimetic forces	84	5.253	1.622	1	7
Q23 Normative pressures	83	4.646	1.794	1	7
Q24 Normative pressures	82	3.815	1.754	1	7
Q25 Normative pressures	84	4.614	1.931	1	7
Q26 Governmental regulations	84	4.048	1.993	1	7
Q27 Governmental regulations	83	4.976	1.610	2	7
Q28 Governmental regulations	84	4.494	1.692	1	7

4.4 Measurement Validity

Before undertaking an exploratory factor analysis or a principal component analysis, an external validity test should be conducted. External validity tests seek to ascertain the existence of sufficient inter-correlation and enough overlaps in the variables to conduct a factor analysis (Stapleton, 1997).

The Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix. This indicates that the variables are unrelated and therefore unsuitable for structure detection. Small values lower than 0.05 of the significance level indicate that factor analysis may be used for the dataset (Child, 2006). In Table 4.2, column 2 shows the Bartlett test statistics with the significant values in brackets. For all nine constructs high Bartlett test statistics were calculated and the significance values were all smaller than the 0.05. Thus, it was confirmed that factor analysis could be used on this dataset.

This outcome could also be verified by using the KMO measure of sampling adequacy, which is a statistic that indicates the proportion of variance in the variables that might be caused by underlying factors. High values close to 1.0 generally indicate that factor analysis may be useful with the data. If the value is less than 0.50, factor analysis would probably not be very useful (Child, 2006). Column 3 of Table 4.2 shows the KMO values for the constructs, and it was observed that there were high KMO values for all the constructs except for governmental regulation and cyber-security. Both Bartlett's test and the KMO approve the use of factor analysis, given the dataset.

Table 4.2: External Validity Test Measures

	Bartlett test of Sphericity	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
Adoption of intelligent ERP	26.768 (0.000)	0.500
ICT infrastructure	26.142 (0.000)	0.706
Cyber-security	77.214 (0.000)	0.400
Technical skills	17.361 (0.002)	0.741
Top management support	142.964 (0.000)	0.663
Coercive forces	103.020 (0.000)	0.500
Mimetic forces	9.803 (0.002)	0.500
Normative pressures	33.399 (0.000)	0.614
Governmental regulations	46.118 (0.000)	0.467

4.4.1 Factor Loading

The results of the Bartlett test of sphericity and the KMO measure of sampling adequacy showed that factor loading could be conducted for the dataset. Table 4.3 shows the factors, eigenvalue, difference, proportion, and cumulative values for each of the 24 factors. Eigenvalues are used to condense the variance in a correlation matrix. The factor with the largest eigenvalue has most variance. Eigenvalues of less than 1 are usually omitted (Tabachnick & Fidell, 1996). This study also used the eigenvalue of 1 cut-off rule. As depicted in Table 4.3, the first seven factors are acceptable. Column 4 of Table 4.3 shows the proportion contribution of each factor to the entire model. The first seven factors contribute immensely to the model. Factor 1 contributes a proportion of 0.2808 and factor 2 a proportion of 0.1592. All the factors after factor number 7 contribute proportions of less than 0.5. The eigenvalues and the proportion statistic agreed on the retention of only factors 1 to 7, as these have eigenvalues greater than 1, which were therefore to be retained.

Table 4.3: Factor Loading (1)

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	**6.74272**	2.92194	**0.2809**	0.2809
Factor 2	**3.82078**	0.52991	**0.1592**	0.4401
Factor 3	**3.29088**	1.31774	**0.1371**	0.5773
Factor 4	**1.97314**	0.21311	**0.0822**	0.6595
Factor 5	**1.76003**	0.36666	**0.0733**	0.7328
Factor 6	**1.39337**	0.27957	**0.0581**	0.7909
Factor 7	**1.11380**	0.13573	**0.0464**	0.8373
Factor 8	0.97806	0.12041	0.0408	0.8780
Factor 9	0.85766	0.20239	0.0357	0.9138
Factor 10	0.65527	0.19779	0.0273	0.9411
Factor 11	0.45748	0.11900	0.0191	0.9601
Factor 12	0.33848	0.11384	0.0141	0.9742
Factor 13	0.22464	0.01958	0.0094	0.9836
Factor 14	0.35711	0.26671	0.0032	0.8446
Factor 15	0.08820	0.02225	0.0037	0.9958
Factor 16	0.06595	0.03147	0.0027	0.9986
Factor 17	0.03448	0.03448	0.0014	1.0000
Factor 18	0.00000	0.00000	0.0000	1.0000
Factor 19	0.00000	0.00000	0.0000	1.0000
Factor 20	0.00000	0.00000	0.0000	1.0000
Factor 21	0.00000	0.00000	0.0000	1.0000
Factor 22	-0.00000	0.00000	-0.0000	1.0000
Factor 23	-0.00000	0.00000	-0.0000	1.0000
Factor 24	-0.00000	0.00000	-0.0000	1.0000

Table 4.4 shows the factor loading for the first seven factors. The table also provides more information on which variables load better under the respective factors. A factor loading value of greater than 0.50 was considered high enough.

Table 4.4: Factor Loading (2)

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Uniqueness
Q7 ICT infrastructure	**0.869**	-0.132	0.035	-0.202	0.175	0.013	0.043	0.153
Q8 ICT infrastructure	**0.823**	0.179	0.022	-0.164	0.054	-0.315	0.187	0.126
Q10 Cyber security	**0.761**	0.3759	-0.233	0.193	0.080	0.197	-0.050	0.139
Q11 Cyber security	**0.757**	0.444	-0.236	0.214	0.033	0.061	0.024	0.123
Q12 Technical skills	**0.661**	0.142	0.080	0.533	0.031	0.185	0.069	0.212
Q9 Cyber security	**0.611**	0.042	-0.445	-0.243	0.062	-0.169	0.341	0.218
Q18 Top management support	0.103	**0.876**	0.161	0.176	0.235	0.156	-0.005	0.086
Q15 Top management support	0.131	**0.834**	0.132	0.002	-0.032	-0.184	-0.148	0.214
Q17 Top management support	0.328	**0.797**	0.059	0.256	0.322	-0.065	0.106	0.070
Q16 Top management support	-0.052	**0.781**	-0.238	0.354	0.219	-0.135	-0.008	0.139
Q22 Mimetic forces	0.253	**0.532**	0.379	-0.356	0.084	0.023	-0.397	0.218
Q23Normative	-0.234	0.0075	**0.824**	-0.074	-0.239	0.200	0.169	0.135
Q21 Mimetic forces	0.077	0.144	**0.809**	-0.152	0.262	0.115	-0.197	0.175
Q24Normative	-0.142	0.140	**0.732**	0.098	0.433	0.0008	0.286	0.146
Q6 Adoption of intelligent ERP	-0.248	0.371	**-0.484**	0.226	0.009	0.103	0.316	**0.406**
Q27Gvtregula	-0.121	0.328	-0.019	**0.836**	0.005	0.226	-0.006	0.128
Q28 Gvtregula	0.152	0.242	-0.115	**0.769**	0.239	-0.356	-0.052	0.127
Q20 Coercive forces	0.032	0.223	-0.037	0.036	**0.932**	0.024	-0.024	0.077
Q19 Coercive forces	0.243	0.284	0.383	0.147	**0.7434**	0.050	-0.043	0.136
Q26 Gvtregula	0.008	0.028	0.003	-0.045	0.0009	**0.927**	-0.248	0.077
Q25 Normative	-0.014	-0.178	0.476	0.088	0.105	**0.758**	0.248	0.086
Q13 Technical skills	0.284	-0.138	0.216	-0.113	-0.093	-0.150	**0.759**	0.233
Q3 Organisational size	0.331	0.399	-0.158	0.368	0.227	-0.202	**0.447**	0.279

For factor 1 variables, *Q7 ICT infrastructure, Q8 ICT infrastructure, Q10 Cyber-security, Q11 Cyber-security, Q12 Technical skills,* and Q*9 ICT infrastructure* had better loading values. A similar pattern was displayed under factor 2, were variables *Q8 ICT infrastructure, Q15 Top*

management support, Q17 Top management support, Q16 Top management support and Q22 *Mimetic forces* had better loading values. This pattern remained unchanged until factor 6, where only *Q26Gvtregula* and *Q25Normative* were the variables with a high loading value.

The last column of Table 4.4 shows the uniqueness, which is the percentage of variance for the variable that is not explained by the common factors. Uniqueness could be a pure measurement error, or it could represent something that is measured reliably in that variable but not by any of the others. The greater the uniqueness, the more likely that it is more than just measurement error. Values of more than 0.6 are usually considered high. In Table 4.4 one can observe that the uniqueness values are all below 0.6, the highest being 0.406 recorded for the variable *Q6 Adoption of intelligent ERP*. If the uniqueness is high, the variable is not well explained by the factors.

4.5 Reliability

Cronbach's alpha is a measure of internal consistency; that is, how closely related a set of items are as a group. It is a measure of scale reliability (Streiner, 2003). A Cronbach value greater than or equal to 0.9 is regarded as excellent, a value between 0.9 and 0.8 is good, between 0.8 and 0.7 is acceptable, between 0.7 and 0.6 is questionable, between 0.6 and 0.5 is poor and any value below 0.5 is unacceptable (Schmitt, 1996). Table 4.5 below shows the Cronbach values, starting with the model with all the variables, followed by models that fit the respective factors derived from the analysis in Tables 4.1 and 4.2.

Table 4.5: Cronbach's Alpha Test

	All	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Scale reliability coefficient	**0.892**	**0.859**	**0.804**	0.462	0.692	**0.923**	0.483	0.291
Number of items in the scale	25	6	5	4	4	2	2	2

According to Table 4.5 the model with all the variables, factor 1, factor 2 and factor 5 have a Cronbach value of at least 0.8, which is good. The other models have low Cronbach values and were thus not considered for the SEM.

4.6 Hypothesis Testing

Considering the tests and the analysis done in the previous sections, the hypotheses was tested using SEM. Given that there were adopters and non-adopters in the sample, the study broke down the SEM into two, the first one being for adopters and the second one for non-adopters. The SEM estimation was linked to the hypothesis formulated in the methodology section.

Table 4.6 shows the regression estimation of the nine constructs with the dependent variable being the adoption of intelligent ERP. Reported in Table 4.6 are the regression coefficients with the p-values in brackets and the t-statistics for each construct in both the adopters and non-adopters models. The p-value should be less than 0.05 for the relationship to be statistically significant at the 5 per cent significance level. The t-statistics should also be greater than or equal to 2 for the relationship to be statistically significant (Bartholomew et al., 2011).

Table 4.6: Structural Equation Model

	Adopters		Non-adopters	
	Coefficient	t-statistic	Coefficient	t-statistic
ICT infrastructure	**1.652 (0.000)**	**6.05**	**0.098 (0.007)**	**3.24**
Cyber security	**1.701 (0.001)**	**4.13**	**1.805 (0.000)**	**6.13**
Technical skills	**3.221 (0.002)**	**2.16**	**0.025 (0.530)**	**0.37**
Organisational size	0.147 (0.069)	1.98	**0.119 (0.001)**	**3.50**
Top management support	0.617 (0.155)	1.54	0.043 (0.281)	1.09
Coercive forces	0.049 (0.129)	1.62	0.00029 (0.992)	0.01
Mimetic forces	**0.059 (0.026)**	**2.28**	**0.388 (0.032)**	**2.20**
Normative pressures	**0.119 (0.001)**	**3.54**	**0.058 (0.030)**	**2.21**
Governmental regulations	0.026 (0.292)	1.10	0.033 (0.338)	0.97

H1- Access to ICT infrastructure is positively related to intelligent ERP adoption. (Accepted for both models.)

For both the adopters model and the non-adopters model, access to ICT infrastructure was found

to be positively associated with the adoption of intelligent ERP. The p values of .000 and .007 respectively show a very significant relationship between ICT infrastructure and the adoption of intelligent ERP for organisations that have already adopted SAP S/4 HANA and those yet to adopt the technology. The relationship between two statistical variables is significant at $p < .05$.

H2- The availability of cyber-security systems is positively related to intelligent ERP adoption. (Accepted for both models.)

The availability of cyber-security systems was also observed to be positively related to intelligent ERP adoption. The p-values of .001 and .000 for adopters and non-adopters respectively demonstrate a statistically significant relationship between the availability of cyber-security systems and the adoption of intelligent ERP.

H3- The availability of technical skills is positively related to intelligent ERP adoption. (Accepted for adopters.)

The findings for the adopters model show that the availability of technical skills was positively related to intelligent ERP adoption. The p value of .002 for the adopters model shows a significant relationship between technical skills and intelligent ERP adoption. For the non-adopters model, however, the hypothesis was rejected, as a p value of .530 was calculated and this demonstrates an insignificant relationship between the two variables.

H4- The size of an organisation is positively related to intelligent ERP adoption. (Accepted for non-adopters.)

For organisations that are yet to adopt intelligent ERP, the size of an organisation was shown to have a positive effect on intelligent ERP adoption with $p=.001$, which shows a very significant relationship between the two variables. The hypothesis was rejected for the adopters model, however, with $p=.069$ being derived for the adopters.

H5- Top management support is positively related to intelligent ERP adoption. (Rejected for both models.)

Top management support was rejected as a factor for intelligent ERP adoption for both models. The reported p values for the adopters and non-adopters models were .155 and .281 respectively and this shows that the relationship between top management support and adoption is not significant.

H6- Coercive forces are positively related to intelligent ERP adoption. (Rejected for both models.)

The two models gave similar results for the relationship between coercive forces and the adoption of SAP S/4 HANA. Coercive forces were shown not to have a positive influence on intelligent ERP adoption and H6 was rejected. The two models gave p-values equal to .129 and .992 for adopters and non-adopters respectively. The relationship between two statistical variables is significant at $p < .05$.

H7- Mimetic pressure is positively related to intelligent ERP adoption. (Accepted for both models.)

The relationship between mimetic pressure and intelligent ERP adoption was calculated as positive, with p values of .026 and .032 for both models. This shows that there is a very significant relationship between the two variables, as these p values are less than .05.

H8- Normative pressure is positively related to intelligent ERP adoption. (Accepted for both models.)

Mimetic pressure was also shown to be a significant predictor of intelligent ERP adoption. With p-values of .001 and .030, both models show a strong positive relationship between the two variables.

H9- Increased regulations are positively related to intelligent ERP adoption. (Rejected for both models.)

The impact of increased government regulations on the adoption of intelligent ERP was rejected by both models, with p-values for adopters being .292 and for non-adopters .338. These values are greater than the significance level of $p < .05$.

4.7 Fitness of the Models

After running the SEM, it is important to check for the fitness of the models. Table 4.7 depicts the results of the goodness of fit test. Seven model fitness tests were conducted, as displayed in column 1 of Table 4.7. In the second column, the decision rule for each of the fitness test measures is listed. In columns 3 and 4, the fitness test scores are given for the two models, namely the adopters and the non-adopters models. Column 5 shows the outcome of comparing the test

statistics and the decision rule. It is normal for some test results to be lower than the acceptable range while others are acceptable. Of the seven fitness of the model tests, four measures point to the models being fit enough. The measures that support the fitness of the models are the root mean squared error of approximation, the standardised root mean squared residual and the normed-fit index. It is also noted that some of the values were slightly below the acceptable range, which might be due to the very low response rate of the study. Though both models are a good fit, the adopters model is a better fit compared to the non-adopters model. This finding is according to the root mean squared error of approximation, which favours the adopters model relative to the non-adopters model. However, there is a thin line between the two models, given that only one fitness measure is separating the two. It can therefore be argued that the SEM results produced by both models are valid.

Table 5: Model Fitness

	Acceptable Value	Model - Adopters	Model - Non-adopters	Outcome
Goodness of fit index	>0.9	0.868	0.865	Slightly below permissible value
Adjusted goodness of fit index	>0.9	0.865	0.823	Slightly below permissible value
RSME Root mean squared error of approximation	0.5<RSME<0.8	0.508	0.468	**Acceptable for Adopters**, but not for Non-Adopters.
SRMR Standardised root mean squared residual	<=0.5	0.338	0.353	**Acceptable**
Normed-fit index	>0.9	0.874	0.832	Slightly below the acceptable value **Adopters model is better than non-adopters model**
Tucker-Lewis index	>0.9	0.973	0.948	**Acceptable**

4.8 Conclusion

This chapter looked at the data analysis following the models specified in the research methodology chapter. The summary statistics of the data show rich and informative data sets. The external validity test - Bartlett test, the KMO measure and the internal validity test, Cronbach's Alpha test, all confirmed the reliability of the data and the appropriateness of using factor analysis. Factor analysis was conducted together with the structural equation model. The outcome of the analysis led to the acceptance of hypotheses 1, 2, 7 and 8 for both the adopters and non-adopters models. The adopters model additionally accepted hypothesis 3, while the non-adopters model also accepted hypothesis 4. The goodness of model fitness measures accepted the appropriateness for the SEM model used, though the adopters model is slightly superior to the non-adopters model.

5. DISCUSSION

This chapter analyses the results of the study in line with the literature review that was conducted in Chapter 2. The research model was split into two models for adopters and non-adopters of intelligent ERP. Hypotheses were proposed for the relationship between the dependent variable "adoption of intelligent ERP" and nine independent variables. Figures 5.1 and 5.2 below depict the theoretical models for the adopters and non-adopters of intelligent ERP respectively as concluded by this study.

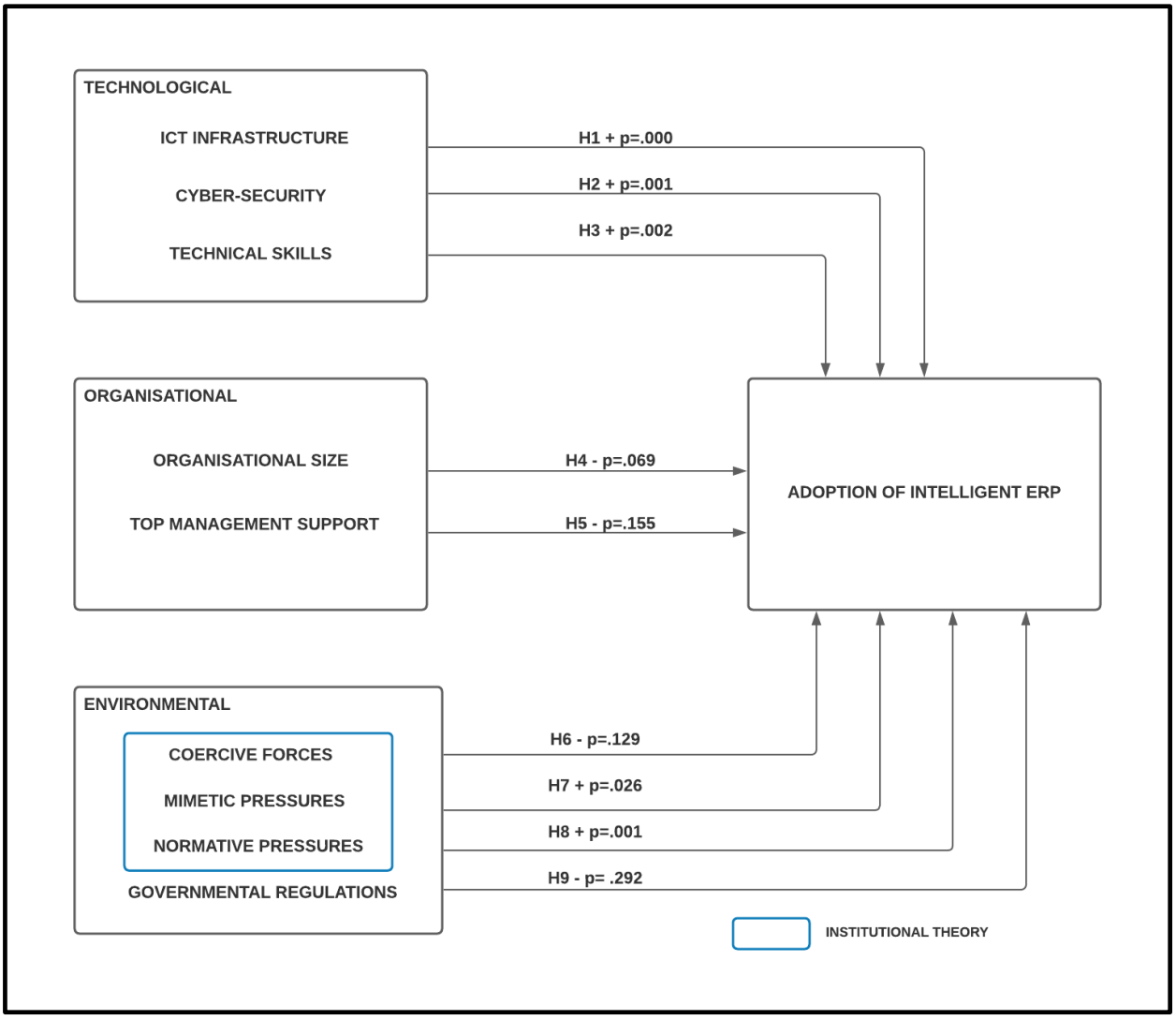


Figure 5.1: Revised Theoretical Model - Adopters

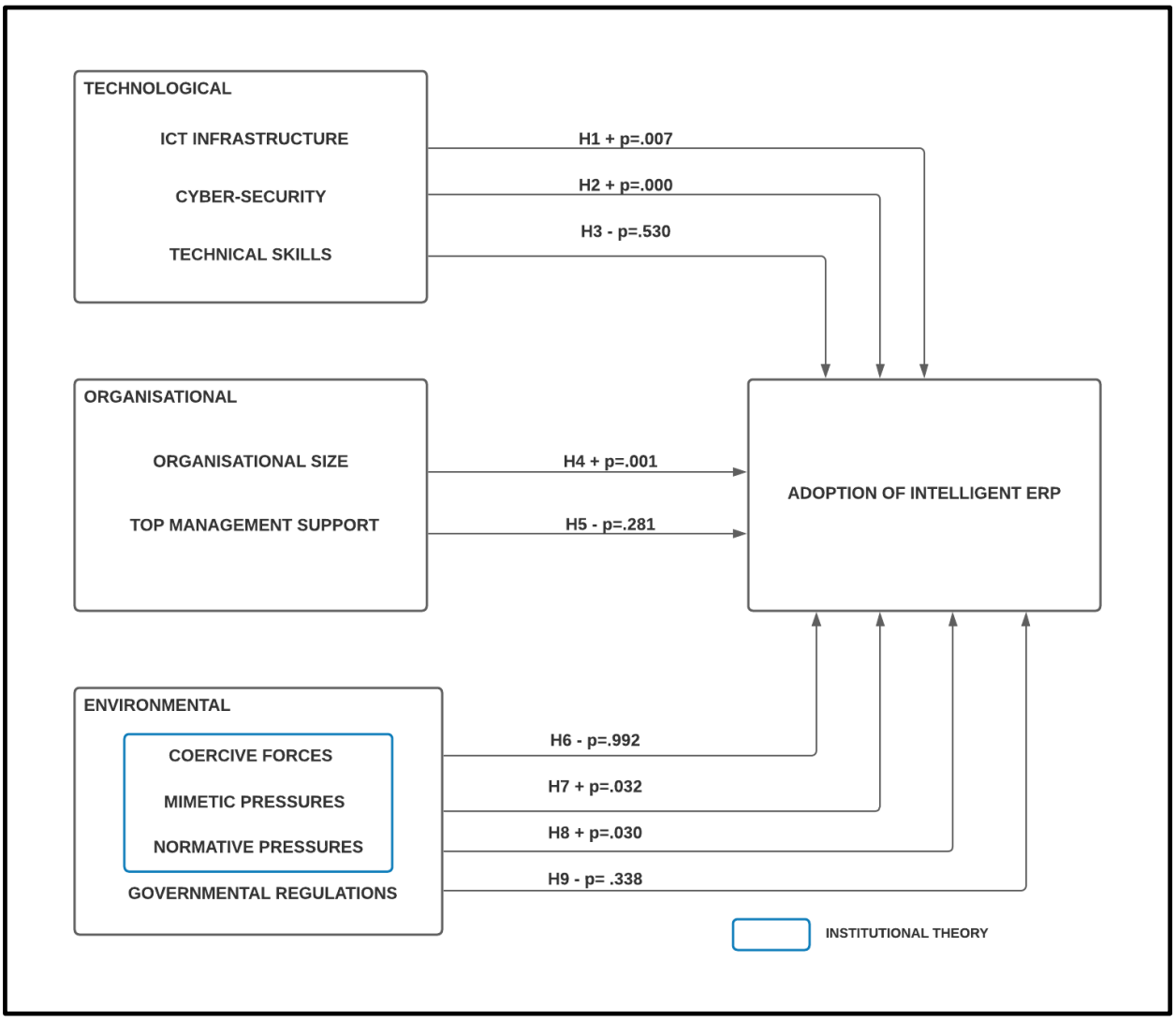


Figure 5.2 Revised Theoretical Model - Non-Adopters

Tables 5.1 and 5.2 below depict the proposed hypotheses for the adopters and non-adopters models and the result of testing the hypotheses for each model.

Table 5.1: Hypothesis Outcomes - Adopters Model

Proposed Hypothesis	Result (p value)	Result t-statistic	Outcome
Hypothesis 1**. Access to ICT infrastructure is positively related to intelligent ERP adoption**	0.000	**6.05**	Accepted
Hypothesis 2**. The availability of cyber-security systems is positively related to intelligent ERP adoption.**	0.001	**4.13**	Accepted
Hypothesis 3**. The availability of technical skills is positively related to intelligent ERP adoption**	0.002	**2.16**	Accepted
Hypothesis 4**. The size of an organisation is positively related to intelligent ERP adoption**	0.069	1.98	Rejected
Hypothesis 5**. Top management support is positively related to intelligent ERP adoption**	0.155	1.54	Rejected
Hypothesis 6**. Coercive forces are positively related to intelligent ERP adoption**	0.129	1.62	Rejected
Hypothesis 7**. Mimetic pressure is positively related to intelligent ERP adoption**	0.026	**2.28**	Accepted
Hypothesis 8**. Normative pressure is positively related to intelligent ERP adoption**	0.001	**3.54**	Accepted
Hypothesis 9**. Increased regulations are positively related to intelligent ERP adoption**	0.292	1.10	Rejected

Table 6: Hypothesis Outcomes - Non-Adopters Model

Proposed Hypothesis	Result (p value)	Result t-statistic	Outcome
Hypothesis 1**. Access to ICT infrastructure is positively related to intelligent ERP adoption**	0.007	**3.24**	Accepted
Hypothesis 2**. The availability of cyber-security systems is positively related to intelligent ERP adoption.**	0.000	**6.13**	Accepted
Hypothesis 3**. The availability of technical skills is positively related to intelligent ERP adoption**	0.530	**0.37**	Rejected
Hypothesis 4**. The size of an organisation is positively related to intelligent ERP adoption**	0.001	**3.50**	Accepted
Hypothesis 5**. Top management support is positively related to intelligent ERP adoption**	0.281	1.09	Rejected
Hypothesis 6**. Coercive forces are positively related to intelligent ERP adoption**	0.992	0.01	Rejected
Hypothesis 7**. Mimetic pressure is positively related to intelligent ERP adoption**	0.032	**2.20**	Accepted
Hypothesis 8**. Normative pressure is positively related to intelligent ERP adoption**	0.030	**2.21**	Accepted
Hypothesis 9**. Increased regulations are positively related to intelligent ERP adoption**	0.338	0.97	Rejected

The findings of the study are discussed below in the three sections of the TOE framework, namely the technological, organisational, and environmental contexts.

5.1 Technological Context

Three independent variables were placed in the technological context of the TOE framework. These included ICT infrastructure, availability of cyber-security systems and the availability of technical skills.

H1- Access to ICT infrastructure is positively related to intelligent ERP adoption. (Accepted for both models.)

For both the adopters model and the non-adopters model, access to ICT infrastructure was found to be positively associated with the adoption of intelligent ERP. This result is consistent with the findings of previous researchers. The role of ICT infrastructure seems to play a more important role in developing countries, as a similar study on ERP adoption by SMEs in Nigeria found a positive relationship between ICT infrastructure and ERP adoption (Awa et al., 2016). For studies based in developed countries, however, the role of ICT infrastructure seemed to be less important in determining whether a company adopts a new ERP system or not (Pan & Jang, 2008).

ICT infrastructure is a major determinant of intelligent ERP adoption in the South African context. To adopt ERP systems like SAP S/4 HANA that are integrated with technologies such as artificial intelligence and machine learning, it is crucial that the right technological infrastructure should be in place. Before adopting such technologies, companies should take a considerable amount of time assessing their technological landscape and ensuring that if they do adopt intelligent ERP, they will be able to harness maximum benefit from the ERP solution.

Organisations should also consider whether the solution will be deployed on-premise or if they will adopt the software as a service option. These two different options have varying infrastructural requirements, data security and cost implications. If suitable ICT infrastructure is not available or if there are compatibility issues with the new ERP system, the benefit of the capital outlay that is made in procuring the intelligent ERP will not be fully realised.

H2- The availability of cyber-security systems is positively related to intelligent ERP adoption. (Accepted for both models)

The study found that the availability of cyber-security systems was positively related to intelligent ERP adoption; 81% of the respondents whose firms had already adopted SAP S/4 HANA confirmed that the data security and data privacy that the intelligent ERP offered were critical adoption factors for them. For non-adopters, the study showed that the issues of data security and privacy were also important and even though they had not yet adopted the solution, most of them were aware of the security that the solution offers. This confirms that the issue of security and privacy is high on the agenda of South African companies as they consider their options on the adoption of ERP systems. In similar studies, the availability of cyber-security systems, privacy

and data protection were found to be critical adoption factors for customers who were considering ERP adoption (Awa et al., 2016). Cyber security was also found to have a significant influence on other IS solutions such as online shopping (Cho et al., 2007).

H3- The availability of technical skills is positively related to intelligent ERP adoption. (Accepted for adopters.)

For the adopters, this study showed that the availability of technical skills is positively related to intelligent ERP adoption. This confirmed the conclusion of some studies that found that firms that had greater technology competencies were more likely to adopt IS technologies (Awa et al., 2016; Zhu & Kraemer, 2005). It was interesting to note that the non-adopters model rejected this hypothesis, which might be explained by limited awareness of what technical skills are required to implement SAP S/4 HANA. Those who had implemented SAP S/4 HANA would probably have been exposed to presentations on the specialised skills required to implement an intelligent ERP such as SAP S/4 HANA.

There is a shortage of SAP ECC skills in the South African context, and it is more difficult to source functional and technical consultants to implement SAP S/4 HANA. As the deadline for implementing SAP S/4 HANA approaches, the cost of hiring a consultant will also increase as more and more companies try to implement the solution (Hartlett, 2020).

5.2 Organisational Context

Two independent variables were placed in the organisational context of the TOE framework, namely organisational size, and top management support.

H4- The size of an organisation is positively related to intelligent ERP adoption. (Accepted for non-adopters.)

The non-adopters model confirms the findings of previous studies where the size of an organisation has been shown to have a positive effect on intelligent ERP adoption (Awa et al., 2016; Ramdani et al., 2009). However, the result was surprisingly different for the adopters, as the responses showed an insignificant relationship between organisational size and the adoption of intelligent ERP. In a previous study on the adoption of e-procurement systems (EPS), organisational size was not a distinguishing factor between EPS adopters and non-adopters (Soares & Palma-dos-Reis, 2008). Organisations of large size might have the financial muscle and other necessary resources to enable them to adopt new technologies; however, it has been

argued in previous literature that smaller organisations might actually be more agile and flexible, as they are less prone to organisational inertia that tends to plague larger organisations (Zhu & Kraemer, 2005).

H5- Top management support is positively related to intelligent ERP adoption. (Rejected for both models.)

Top management support was rejected in both models. Although there are numerous studies that accept the hypothesis that top management support has a positive influence on IS adoption (Awa et al., 2016; Kinuthia, 2015), this study rejected this notion and concurred with the findings of Veit et al. (2011), which found that the role of top management in influencing the adoption of E-procurement systems was only moderate.

Given that most of the respondents were not from senior levels of management, they might not have had the necessary insight into management's commitment or lack thereof in respect of the adoption of new technologies. This is one limitation of this study and future studies could focus on targeting more senior managers to gain insight into the impact of top management on intelligent ERP adoption.

5.3 Environmental Context

Four independent variables were placed in the environmental context of the TOE framework, namely coercive forces, mimetic pressures, normative pressures and increased governmental regulations.

H6- Coercive forces are positively related to intelligent ERP adoption. (Rejected for both models.)

The two models gave similar results for the relationship between coercive forces and the adoption of SAP S/4 HANA. Coercive forces were shown not to have a positive influence on intelligent ERP adoption and H6 was rejected. These findings are contrary to the findings of researchers such as Yoon and George (2013), who found a positive relationship between the two variables.

These results might be explained by the relatively low uptake of SAP S/4 HANA in South Africa at this stage. Most companies are yet to move to SAP S/4 HANA and those that have migrated to it are still "finding their feet". It might be too early for them to start expecting or demanding from other players in the supply chain to also adopt the advanced technology. It might be more relevant

to investigate this in future as more companies adopt the intelligent ERP.

It is interesting to note, however, that regarding the question of the implementation deadline imposed by SAP having an influence on the decision to adopt SAP S/4 HANA, a mean value of 4.14 and 4.69 on a seven-point Likert scale was recorded for adopters and non-adopters respectively. This shows that the deadline influences the decision to migrate and as the implementation deadline for SAP S/4 HANA approaches, more companies might be forced to adopt SAP S/4 HANA or to pay extra costs for maintenance of SAP ECC 6.0 (Hartlett, 2020).

H7- Mimetic pressure is positively related to intelligent ERP adoption. (Accepted for both models.)

The relationship between mimetic pressure and intelligent ERP adoption was calculated as positive for both adopters and non-adopters. This concurs with the findings of previous researchers who also found that mimetic pressure has a positive influence on the adoption of intelligent ERP (Awa et al., 2017; Yoon & George, 2013).

Though few companies have adopted SAP S/4 HANA, there is increased pressure on companies to adopt the technology once they realise that their competitors have adopted this breakthrough technology. If an organisation perceives that its competitor is successful because of the new technology that it has acquired, there will be pressure on the organisation to acquire the same technology as well (Haveman, 1993). This study shows that mimetic pressure has a significant impact on those who have adopted SAP S/4 HANA and those who are yet to adopt the ERP solution.

H8- Normative pressure is positively related to intelligent ERP adoption. (Accepted for both models.)

Normative pressure was shown to be a significant predictor of intelligent ERP adoption. These findings are also substantiated by previous literature (Awa et al., 2017; Yoon & George, 2013).

In the South African context, there is subtle pressure to conform with the other organisations, as bodies such as AFSUG are used as vehicles to encourage member organisations to adopt SAP S/4 HANA (AFSUG, 2020). SAP conducts roadshows where they showcase how similar organisations in the South African context have successfully adopted SAP S/4 HANA. Such initiatives appear to have had a positive influence on the rate of SAP S/4 HANA adoption in South

Africa.

H9- Increased regulations are positively related to intelligent ERP adoption. (Rejected for both models.)

The impact of increased government regulations on the adoption of intelligent ERP was rejected by both models. This is contrary to the findings of previous researchers (Zhu & Kraemer, 2005) who found a positive relationship between the two variables. These results, however, agree with other findings from literature, which found that the impact of regulatory policy on ERP adoption was insignificant (Pan & Jang, 2008).

As much as the respondents were aware of the laws on data privacy and data security regulations, in a South African context the existence of data privacy laws actually seems to make organisations hesitant to adopt technologies that put them at risk of exposure to data breaches. There is concern when it comes to the laws that govern the use of cloud computing. Having an organisation's data managed by a third party poses a risk, as the data may not be secure in the hands of the cloud vendor. This scenario is more complicated if the vendor is based in a different legal jurisdiction, as the governing laws are different (Pazvakavambwa, 2017). These complications may push an organisation simply to retain control of its data to avoid the regulatory complications that come with third party cloud computing agreements.

5.4 Conclusion

This chapter analysed the results of the study in line with the literature review that was conducted in Chapter 2. The research model was split into two models for adopters and non-adopters of intelligent ERP. Hypotheses were proposed for the relationship between the dependent variable "adoption of intelligent ERP" and nine independent variables. ICT infrastructure, the availability of cyber-security systems, as well as normative and mimetic pressures were seen to have a significant impact on the adoption of intelligent ERP. The availability of technical skills and organizational size were only partially supported as factors of intelligent ERP adoption, while top management support, coercive forces and increased government regulations were rejected as factors of intelligent ERP adoption.

6. CONCLUSION

This chapter will summarise the findings of this study to ensure that the research questions upon which this study was based were addressed, as well as to verify that the research objectives were met. This will be followed by a discussion on the practical and academic implications of the research findings. The limitations of the study are outlined, and potential areas of future research will be suggested. Finally, closing remarks are given to conclude the study.

6.1 Summary of Findings

This study was founded on the premise of one main research question, which was, "What are the factors affecting ERP migrations in South Africa?"

Having carried out a review of existing literature and conducted a questionnaire-based survey that was distributed to various IS professionals who are employed by South African companies that run on SAP ERP, the study sheds some light on this research question.

A review of existing literature shows that ERP vendors have redesigned traditional ERP systems by incorporating next generation technologies such as AI, machine learning, IoT and cloud computing. The integration of these technologies and ERP systems has given ERPs a new lease of life, as they now offer advanced capabilities to ERP customers who might have been disgruntled with their existing ERP implementations.

In the context of a developing country such as South Africa, four factors were found to have a significant impact on the migration to new ERP versions within the digital economy, namely access to ICT infrastructure, the availability of cyber-security systems, mimetic forces and normative pressures. These factors were confirmed as being significant by both adopters and non-adopters of the intelligent ERP, SAP S/4 HANA. Two factors were only partially supported as factors affecting intelligent ERP adoption, namely technical skills, which was confirmed as a factor by organisations that have already adopted SAP S/4 HANA, and organisational size, which was only confirmed as a positive factor for intelligent ERP adoption by firms that are yet to adopt SAP S/4 HANA. Three factors were rejected by both the adopters and the non-adopters models, namely top management support, coercive forces, and increased government regulations.

Only 26% of the respondents confirmed that their organisations had migrated to the new ERP version, which implies that adoption of intelligent ERPs is still in its infancy in South Africa. From a technological advancement perspective, the results show that 59% of those that have adopted intelligent ERP have embraced cloud computing in the form of hybrid, public or private cloud deployment options for their intelligent ERP solutions. This could be a sign that South African organisations are willing to embrace next generation technologies as part of their ERP implementations going forward.

6.2 Implications for Practice

The findings of this study can be beneficial to ERP vendors, ERP customers as well as government institutions.

ERP vendors should be cognisant of the factors that have a key influence on customers' decisions on the adoption of new ERP technologies such as intelligent ERP. According to the results of this study, the availability of ICT infrastructure is a major determinant factor of technology adoption in the South African context. ERP vendors must be sensitive to the technological infrastructure that is available to their customers, as well as the digital divide that plagues the nation of South Africa as a whole (Sulla & Zikhali, 2018). Many South African factories are deemed to have outdated information technology and industrial equipment, which is not a suitable foundation upon which next generation technologies can be implemented (Bayode, 2019). Government should ensure that there is a reliable supply of electricity to not only the public and private sector corporations, but to the general population as well. Technologies such as IoT also require stable fixed and wireless broadband so that SAP's customers and their stakeholders can fully harness the power of intelligent ERPs.

The increased rate of cyber-security and data breaches has become a major concern for most organisations. The organisations that are yet to adopt intelligent ERP solutions, especially those hosted on the cloud, may have a perception that storing their customers' private data and their entire record of business will make them vulnerable to hackers (Kinuthia, 2015). It is therefore important that ERP vendors should ensure that they offer existing and potential adopters of intelligent ERPs the assurance that their data will be secure, should they opt to adopt these solutions.

This study has shown that mimetic and normative pressures have a significant influence on ERP

customers' decision to adopt intelligent ERP. It is interesting to note that coercive pressure was not shown to have any significant influence on the adoption of SAP S/4 HANA. As more customers adopt the solution, they may begin to demand that trade partners also implement the same technologies, but at this point in time it is clear that ERP vendors should leverage the power of customer testimonials via user groupings and other trade associations to encourage the adoption of intelligent ERP.

6.3 Implications for Academia

The research model for this research paper was based on the TOE framework. Combining the TOE framework and the institutional theory further enhances the theoretical strengths of the TOE framework by giving more context to the environmental aspect of the TOE framework (Oliveira & Martins, 2011).

Very limited research is available on intelligent ERP adoption. This study adds to existing literature on IS adoption studies. This research model proposed nine factors positioned within the TOE framework as being drivers of the adoption of intelligent ERP in the South African context. The significance of the relationship between each independent variable and the dependent variable was statistically tested and insightful results were derived from these tests. In the technological context, access to ICT infrastructure and the availability of cyber-security systems were accepted as having an impact on intelligent ERP adoption, while the availability of technical skills was only partially accepted. In the organisational context, organisational size was partially accepted, while top management support was rejected as a factor of intelligent ERP adoption. Lastly, in the environmental context, mimetic and normative pressures were accepted as factors of intelligent ERP adoption, while coercive forces and increased regulations were rejected.

The implications of the research findings are valuable from both a theoretical and practical perspective and lay a foundation for further research. By conceptualising a research model that integrates the TOE framework and the institutional theory, the paper contributes to the IS theoretical discourse by assessing the impact of the factors in the perspective of a developing country such as South Africa. The model also contributes to the study of IS adoption by focusing on the adoption of ERP technologies that have been developed in the context of the digital economy.

6.4 Limitations

There are certain limitations to the study. Firstly, this study was based upon the experiences and perceptions of users of one intelligent ERP product (SAP) who are based in one country, namely South Africa. More generalisable results could potentially have been obtained by surveying ERP users of different products, from other countries as well.

Secondly, the non-probability sampling strategy that was employed in this study, led to a limit of external validity of the results of the study. The sample of respondents was dependent on online searches, as well as the researcher's prior knowledge of organisations that are SAP ERP customers. An official, exhaustive list of South African SAP ERP customers would have been beneficial to this study, as this would have allowed the researcher to reach out to more customers.

Although an attempt was made to target the survey at mid-level to senior-level managers of organisations, these respondents were not always available to assist and this could have skewed the results that were obtained, as the majority of respondents were not the decision-makers when it comes to intelligent ERP adoption in their respective organisations.

Finally, being a cross-sectional study, the study has a lack of temporal precedence in the data which introduces limitations to causal inference. Owing to the short period within which this study had to be completed, the results from a cross-sectional study will have to suffice.

6.5 Future Research

Future researchers could potentially integrate the TOE framework with other theoretical frameworks, such as the DOI and the UTAUT theories (Awa et al., 2017; Oliveira & Martins, 2011). Even though South Africa is deemed to be a developing nation, it will be beneficial to focus on intelligent ERP adoption in the context of countries with economies that are not as strong and economies that have a less developed infrastructural system than that of South Africa. Future research on intelligent ERP adoption could also focus on the adoption of other intelligent ERPs, such as Oracle's Adaptive Intelligent Applications for ERP and Microsoft's Dynamics CRM.

6.6 Conclusion

The study of the adoption of intelligent ERP systems is a greenfield for IS research. It is the researcher's belief that this study contributes to the IS body of knowledge and gives insight to ERP vendors on the factors that hinder or enable the adoption of these technologies in the digital

era. The challenges that developing countries face require ERP customers in these regions to make informed decisions on their IS investments. Studies such as this help to shed light on the new and improved ERP product offerings of the digital economy, as well as lay a foundation for further studies in IS research.

REFERENCES

AFSUG. (2020). *Special Interest Groups*. AFSUG. https://afsug.com/special-interest-groups/

Ahmed, R. (2019). *SAP S/4HANA Migration: State of the Market*. SAPinsider. https://www.sapinsideronline.com/webinars/sap-s-4hana-migration-state-of-the-market

Ahn, B., & Ahn, H. (2020). Factors Affecting Intention to Adopt Cloud-Based ERP from a Comprehensive Approach. *Sustainability*, *12*(16), 6426. https://doi.org/10.3390/su12166426

Armstrong, C. P., & Sambamurthy, V. (1999). Information Technology Assimilation in Firms: The Influence of Senior Leadership and IT Infrastructures. *Information Systems Research*, *10*(4), 304–327.

Asprion, P., Schneider, B., & Grimberg, F. (2018). ERP Systems Towards Digital Transformation. In *Studies in Systems, Decision and Control* (pp. 15–29). https://doi.org/10.1007/978-3-319-74322-6_2

ASUG. (2018). *Maintenance 2040*. https://support.sap.com/en/release-upgrade-maintenance/maintenance-information/maintenance-strategy/s4hana-business-suite7.html

Awa, H. O., Ukoha, O., & Emecheta, B. C. (2016). Using T-O-E theoretical framework to study the adoption of ERP solution. *Cogent Business & Management*, *3*(1), 1196571. https://doi.org/10.1080/23311975.2016.1196571

Awa, H. O., Ukoha, O., & Igwe, S. R. (2017). Revisiting technology-organization-environment (T-O-E) theory for enriched applicability. *The Bottom Line; Bradford*, *30*(1), 2–22. http://0-dx.doi.org.innopac.wits.ac.za/10.1108/BL-12-2016-0044

Bartholomew, D. J., Knott, M., & Moustaki, I. (2011). *Latent variable models and factor analysis: A unified approach*. John Wiley & Sons. http://eu.wiley.com/WileyCDA/

Bayode, A. (2019). 4th Industrial Revolution: Challenges and Opportunities in the South African Context. *Waste Management*, 7.

Belkhamza, Z., & Wafa, S. (2009). The Effect of Perceived Risk on the Intention to Use E-commerce: The Case of Algeria. *Journal of Internet Banking and Commerce*, *14*.

Bhattacherjee. (2012). *Social Science Research: Principles, Methods and Practices*.

Chiang, I.-C. A., Jhangiani, R. S., & Price, P. C. (2015). Correlational Research. In *Research Methods in Psychology*. BCcampus. https://opentextbc.ca/researchmethods/chapter/correlational-research/

Child, D. (2006). *The Essentials of Factor Analysis* (3rd edition). Bloomsbury Academic.

Cho, D., Kwon, H. J., & Lee, K. (2007). Analysis of Trust in Internet and Mobile Commerce Adoption. *2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07)*, 50–50. https://doi.org/10.1109/HICSS.2007.76

Claybaugh, C. C., Ramamurthy, K., & Haseman, W. D. (2017). Assimilation of enterprise technology upgrades: A factor-based study. *Enterprise Information Systems*, *11*(2), 250–283. https://doi.org/10.1080/17517575.2015.1041060

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education, 6th ed*. Routledge/Taylor & Francis Group.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, *78*(1), 98–104. https://doi.org/10.1037/0021-9010.78.1.98

Damanpour, F. (1996). Organizational Complexity and Innovation: Developing and Testing Multiple Contingency Models. *Management Science*, *42*(5), 693–716. JSTOR.

Deloitte. (2017). *Deloitte_ERP_Industrie-4-0_Whitepaper.pdf—Industry 4.0 Is your ERP system ready for the digital era Investing in Germany | A guide for Chinese | Course Hero*. https://www.coursehero.com/file/35526389/Deloitte-ERP-Industrie-4-0-Whitepaperpdf/

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147–160. https://doi.org/10.2307/2095101

Dong, L., & Neufeld, D. (2009). *(14) (PDF) Top management support of enterprise systems implementation*. ResearchGate. https://www.researchgate.net/publication/220220684_Top_management_support_of_enterp

rise_systems_implementation

Dwivedi, Y. K., Wade, M. R., & Schneberger, S. L. (Eds.). (2012). *Information Systems Theory: Explaining and Predicting Our Digital Society, Vol. 1*. Springer-Verlag. https://doi.org/10.1007/978-1-4419-6108-2

Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, *4*(1). https://doi.org/10.17705/1CAIS.00407

Gibbs, J., & Kraemer, K. (2004). *A Cross-Country Investigation of the Determinants of Scope of E-commerce Use: An Institutional Approach: Electronic Markets: Vol 14, No 2*. https://www.tandfonline.com/doi/abs/10.1080/10196780410001675077

Ha, Y. M., & Ahn, H. J. (2014). Factors affecting the performance of Enterprise Resource Planning (ERP) systems in the post-implementation stage. *Behaviour & Information Technology*, *33*(10), 1065–1081. https://doi.org/10.1080/0144929X.2013.799229

Hartlett, G. (2020). *State of panic presents worthwhile opportunity to migrate to SAP S/4 HANA*. ITWeb. https://www.itweb.co.za/content/VgZeyvJoeVo7djX9

Haveman, H. (1993). Follow The Leader: Mimetic Isomorphism And Entry Into New Markets. *Administrative Science Quarterly*, *38*. https://doi.org/10.2307/2393338

Hoque, A. (2019). *SAP S/4HANA Cloud and On-Premise Deployment Options | SAP Blogs*. https://blogs.sap.com/2019/08/22/sap-s4hana-cloud-and-on-premise-deployment-options/

Hutchison, C. (2015). *How Much Does an ERP Implementation Cost?* https://blog.cfbs-us.com/blog-1/how-much-is-erp

i-SCOOP. (2019). *From ERP to intelligent ERP in the smart factory and supply chain*. I-SCOOP. https://www.i-scoop.eu/industry-4-0/erp-intelligent-erp/

Islam, M. A., Jantan, A. H., Hashim, H. B., Chong, C. W., Abdullah, M. M., Rahman, M. A., & Hamid, A. B. A. (2018). Fourth Industrial Revolution in Developing Countries: A Case on Bangladesh. *Journal of Management Information and Decision Sciences; Weaverville*, *21*(1), 1–9.

Kimberling, E. (2019). SAP S/4HANA vs. Oracle ERP Cloud: Clash of the Titans. *Third Stage Consulting Group*. https://www.thirdstage-consulting.com/sap-s-4hana-vs-oracle-erp-cloud-clash-of-the-titans/

Kinuthia, J. (2015). Technological, Organizational, and Environmental Factors Affecting the Adoption of Cloud Enterprise Resource Planning (ERP) Systems. *AMCIS*.

Križanić, S., Šestanj Perić, T., & Tomičić- Pupek, K. (2019). The changing role of ERP and CRM in Digital Transformation. *Economic and Social Development, 41st International Scientific Conference on Economic and Social Development, Book of Proceedings*, 248.

Lekhanya, L. M. (2019). Public Outlook on Creative Methodologies for the 4th Industrial Revolution in South Africa. *International Journal of Entrepreneurship; Arden*, *23*(3), 1–13.

Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management. *MIS Quarterly*, *31*(1), 59–87. JSTOR. https://doi.org/10.2307/25148781

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry / Y.S. Lincoln, E.G. Guba.*

Mahmood, F., Khan, A. Z., & Bokhari, R. H. (2019). ERP issues and challenges: A research synthesis. *Kybernetes; London*, *49*(3), 629–659. http://0-dx.doi.org.innopac.wits.ac.za/10.1108/K-12-2018-0699

Majstorovic, V., & Stojadinovic, S. (2020). Erp Model for Industry 4.0 Concept. *Proceedings in Manufacturing Systems; Bucharest*, *15*(1), 21–26.

McGaughey, R. E., & Gunasekaran, A. (2007). Enterprise Resource Planning (ERP): Past, Present and Future. *International Journal of Enterprise Information Systems; Hershey*, *3*(3), 23–35. http://0-dx.doi.org.innopac.wits.ac.za/10.4018/jeis.2007070102

Mello, S. C. B. de, & Collins, M. (2001). Convergent and discriminant validity of the perceived risk scale in business-to-business context using the multitrait-multimethod approach. *Revista de Administração Contemporânea*, *5*(3), 167–186. https://doi.org/10.1590/S1415-65552001000300009

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*.

Mir, U. (2014). *Effect of Organizational Culture and Top Management Support on Erp Implementation*. https://www.academia.edu/29610833/Effect_of_Organizational_Culture_and_Top_Management_Support_on_Erp_Implementation

Morrar, R., Arman, H., & Mousa, S. (2017). The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective. *Technology Innovation Management Review*, *7*(11), 10.

Morris, H. D., Mahowald, R. P., Jimenez, D.-Z., Stratis, A., Rizza, M. N., Hayward, D., & Motai, Y. (2013). *i-ERP (Intelligent ERP): The New Backbone for Digital Transformation*. 13.

Ndabeni-Williams. (2019). *Preparing SA for 4IR*. SAnews. https://www.sanews.gov.za/south-africa/preparing-sa-4ir

Oates. (2005). *Researching information systems and computing*. SAGE.

Oliveira, T., & Martins, M. F. (2011). *Literature Review of Information Technology Adoption Models at Firm Level*. Issuu. https://issuu.com/academic-conferences.org/docs/ejise-volume14-issue1-article705/1

Orlikowski, W., & Baroudi, J. (1991). *(13) (PDF) Studying Information Technology in Organizations: Research Approaches and Assumptions*. https://www.researchgate.net/publication/220079919_Studying_Information_Technology_in_Organizations_Research_Approaches_and_Assumptions

Pan, M.-J., & Jang, W.-Y. (2008). Determinants of the Adoption of Enterprise Resource Planning Within the Technology-Organization-Environment Framework: Taiwan's Communications Industry. *The Journal of Computer Information Systems; Stillwater*, *48*(3), 94–102.

Panorama Consulting. (2008). *ERP Report Archives*. Panorama Consulting Group. https://www.panorama-consulting.com/resource-center/erp-report-archives/

Pazvakavambwa, R. (2017). *Cloud adopters must comply with data laws | ITWeb*. https://www.itweb.co.za/content/kxA9PO7NY6wvo4J8

Piccarozzi, M., Aquilani, B., & Gatti, C. (2018). Industry 4.0 in Management Studies: A Systematic

Literature Review. *Sustainability; Basel*, *10*(10). http://0-dx.doi.org.innopac.wits.ac.za/10.3390/su10103821

Plessis, J.-J., & Mwalemba, G. (2016). *Adoption of emerging technologies into ERP systems landscape: A South African study* (p. 399). https://doi.org/10.1109/EmergiTech.2016.7737373

Poba-Nzaou, P., Raymond, L., & Fabi, B. (2008). Adoption and risk of ERP systems in manufacturing SMEs: A positivist case study. *Business Process Management Journal; Bradford*, *14*(4), 530–550. http://0-dx.doi.org.innopac.wits.ac.za/10.1108/14637150810888064

Porter, M. E., & Millar, V. E. (1985). *How Information Gives You Competitive Advantage—Article—Faculty & Research—Harvard Business School*. https://www.hbs.edu/faculty/Pages/item.aspx?num=4322

Prisecaru, P. (2016). Challenges of the Fourth Industrial Revolution. *Knowledge Horizons. Economics; Bucharest*, *8*(1), 57–62.

Ramdani, B., Kawalek, P., & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *J. Enterprise Inf. Management*, *22*, 10–24. https://doi.org/10.1108/17410390910922796

SAP. (2019a). *Move to the Cloud at Your Speed with SAP S/4HANA*. SAP. https://www.sap.com/documents/2019/04/a0c13e64-467d-0010-87a3-c30de2ffd8ff.html

SAP. (2019b). *The Intelligent Enterprise*. SAP. https://www.sap.com/africa/products/intelligent-enterprise.html

SAP. (2020a). *Strategy*. https://support.sap.com/en/offerings-programs/strategy.html

SAP. (2020b). *The Intelligent Enterprise | Key Components and Solutions*. SAP. https://www.sap.com/africa/products/intelligent-enterprise.html

SAP Support, S. (2020). *Maintenance 2040*. https://support.sap.com/en/release-upgrade-maintenance/maintenance-information/maintenance-strategy/s4hana-business-suite7.html

Schmitt, N. (1996). *Uses and abuses of coefficient alpha.* https://doi.org/10.1037/1040-3590.8.4.350

Select Hub. (2020). *Top 10 ERP Software Vendor Companies Comparison 2020—SelectHub*. https://app.selecthub.com/categories/enterprise-resource-planning-erp

Shah, M. A., Elyas, T., & Nasseef, O. (2013). Research Paradigms: A Slippery Slope for Fresh Researchers. *Life Science Journal*, *10*.

Shehab, E. M., Sharp, M. W., Supramaniam, L., & Spedding, T. A. (2004). Enterprise resource planning: An integrative review. *Business Process Management Journal*, *10*(4), 359–386. https://doi.org/10.1108/14637150410548056

Slokenberga, S., Reichel, J., Niringiye, R., Croxton, T., Swanepoel, C., & Okal, J. (2019). EU data transfer rules and African legal realities: Is data exchange for biobank research realistic? *International Data Privacy Law; Oxford*, *9*(1), 30–48. http://0-dx.doi.org.innopac.wits.ac.za/10.1093/idpl/ipy010

Soares, A., & Palma-dos-Reis, A. (2008). *(15) (PDF) Why Do Firms Adopt E-Procurement Systems? Using Logistic Regression to Empirically Test a Conceptual Model*. ResearchGate. https://www.researchgate.net/publication/3077057_Why_Do_Firms_Adopt_E-Procurement_Systems_Using_Logistic_Regression_to_Empirically_Test_a_Conceptual_Model

Soliman, K. S., & Janz, B. D. (2004). An exploratory study to identify the critical factors affecting the decision to establish Internet-based interorganizational information systems. *Information & Management*, *41*(6), 697–706. https://doi.org/10.1016/j.im.2003.06.001

Stapleton, C. D. (1997). *Basic Concepts in Exploratory Factor Analysis (EFA) as a Tool To Evaluate Score Validity: A Right-Brained Approach*. https://eric.ed.gov/?id=ED407419

Streiner, D. L. (2003). Starting at the Beginning: An Introduction to Coefficient Alpha and Internal Consistency. *Journal of Personality Assessment*, *80*(1), 99–103. https://doi.org/10.1207/S15327752JPA8001_18

Sulla, V., & Zikhali, P. (2018). *Overcoming Poverty and Inequality in South Africa: An Assessment of Drivers, Constraints and Opportunities* (No. 124521; pp. 1–148). The World Bank. http://documents.worldbank.org/curated/en/530481521735906534/Overcoming-Poverty-and-Inequality-in-South-Africa-An-Assessment-of-Drivers-Constraints-and-Opportunities

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. HarperCollins College Publishers.

Tornatzky, L., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.

UNDP. (2020). *Socio-Economic Impact of COVID-19 in South Africa | UNDP in South Africa*. UNDP. https://www.za.undp.org/content/south_africa/en/home/library/socio-economic-impact-of-covid-19-on-south-africa.html

Veit, D., Parasie, N., & Huntgeburth, J. C. (2011). E-Procurement Adoption at the Municipal Level: Influence of Organizational, Technological and Environmental Factors. *2011 44th Hawaii International Conference on System Sciences*. https://doi.org/10.1109/HICSS.2011.177

Weber, R. (2004). Editor's Comments. *MIS Quarterly*, *28*(1).

Wood, T., & Caldas, M. (2001). Reductionism and complex thinking during ERP implementations. *Business Process Management Journal*, *7*, 387–393. https://doi.org/10.1108/14637150110406777

Wu, P. (2016). *Learning Enterprise Resource Planning (ERP) through Business Simulation Game* (p. 3). https://doi.org/10.1145/2925995.2926054

Yoon, T. E., & George, J. F. (2013). Why aren't organizations adopting virtual worlds? *Computers in Human Behavior*, *29*(3), 772–790. https://doi.org/10.1016/j.chb.2012.12.003

Zhu, K., & Kraemer, K. L. (2005). Post-Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry. *Information Systems Research*, *16*(1), 61–84. https://doi.org/10.1287/isre.1050.0045

Zwilling, C. E. (2017). *New Approaches for Outlier Detection* [Ph.D., University of Illinois at Urbana-Champaign]. http://0.search.proquest.com/docview/2035480509/abstract/3D6F9B0A3800420FPQ/5

APPENDIX

APPENDIX A: QUESTIONNAIRE

Dear Sir/Madam,

My name is Precious Mushayi, and I am a Master's student in Information Systems at the University of the Witwatersrand, Johannesburg. I am currently investigating "The factors that affect ERP migrations: The South African Customer's Perspective" under the supervision of Dr Thembekile Mayayise. As part of this project, I would like to invite you to take part in answering an online questionnaire. This activity will involve you responding to 28-30 questions and this will take around 5 minutes to complete. Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. The responses to the questionnaire will be completely confidential and anonymous as I will not be publishing your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. If you have questions at any time about the survey or the procedures, you may contact me on 0823887368 or by email at 2252474@students.wits.ac.za or prmushayi@gmail.com. Thank you very much for your time and support. Please start with the survey now by clicking on the Next button below

1. What is your job title?

2. In what industry does your organisation operate?

1. Agriculture, forestry, and fishing
2. Mining and quarrying
3. Manufacturing
4. Electricity, gas and water
5. Construction
6. Wholesale and retail trade
7. Hotels and restaurants
8. Transport
9. Finance, real estate and business services
10. Healthcare
11. Information and Communication Technologies
12. Other _____

3. How many people are in your organisation?

1. 1-50
2. 51-100
3. 101-500
4. 501-1000
5. 1 001-5 000
6. 5001-10 000
7. >10 000

4. Does your organisation run SAP?

1. Yes
2. No

5. Has your organisation migrated to SAP S/4 HANA?

1. Yes

2. No
3. Not Sure

6. Which SAP S/4 HANA deployment option has your organisation embarked on?

1. On-premise option
2. Public cloud option
3. Private cloud option
4. Hybrid option

Please confirm if the next set of statements accurately describes your organisation's migration to SAP S/4 HANA:

7. SAP S/4 HANA was easily compatible with the organisation's existing ICT infrastructure.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

8. The ICT infrastructure available to the organisation was sufficient to justify a move to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

9. SAP S/4 HANA's security environment gave the organisation the confidence to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

10. The organisation was confident that the company's data would be protected from unauthorised changes and use in SAP S/4 HANA.

	1	2	3	4	5	6	7

Response	❑	❑	❑	❑	❑	❑	❑

11. The organisation was confident that private and sensitive data would be protected in SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

12. There is sufficient availability of local certified SAP implementation partners/consultants to implement and support SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

13. The organisation regularly trains its employees on new technologies.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

14. There were concerns regarding the availability of internal skilled resources to be able to support end-users of SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

15. The organisation's top management aggressively invests funds in new information technologies.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

16. The organisation's top management was aware of possible risks associated with the migration to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

17. The organisation's top management was interested in adopting SAP S/4 HANA in order to gain a competitive advantage.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

18. Top management considered the adoption of SAP S/4 HANA as being strategically important.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

19. There were customers that expected the organisation to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

20. There were customers that encouraged the organisation to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

21. The organisation could have lost customers if it had not adopted SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

22. The adoption of SAP S/4 HANA was a strategic necessity for the organisation.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

23. The organisation was encouraged by SAP user groupings to adopt SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

24. There were other industry sources (e.g., SAP white papers, SAP implementation partners) that put pressure on the organisation to adopt SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

25. The organisation adopted SAP S/4 HANA because of the deadline for the end of SAP ECC 6.0 support that was announced by SAP in 2018.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

26. The organisation was hesitant to adopt SAP S/4 HANA in the cloud owing to restrictive governmental policies e.g., data privacy and security laws.

	1	2	3	4	5	6	7	N/A
Response	❑	❑	❑	❑	❑	❑	❑	❑

27. The organisation was well versed in the data privacy laws that have to be adhered to in adopting SAP S/4 HANA in the cloud.

	1	2	3	4	5	6	7

Response	❑	❑	❑	❑	❑	❑	❑

28. Existing government regulations on data privacy gave the organisation the confidence to migrate to SAP S/4 HANA in the cloud.

	1	2	3	4	5	6	7	N/A
Response	❑	❑	❑	❑	❑	❑	❑	❑

NON-ADOPTERS

6. Is your organisation likely to start taking the necessary steps to migrate to SAP S/4 HANA?

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

7. How soon do you think your organisation will adopt SAP S/4 HANA?

1. Less than six months
2. 6-12 months
3. 12-18 months
4. 18-24 months
5. More than 24 months
6. Not sure
7. No plans to migrate to SAP S/4 HANA

Please confirm if the next set of statements accurately describes your organisation with respect to the migration to SAP S/4 HANA:

8. S/4 HANA is compatible with the organisation's existing ICT infrastructure.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

9. The ICT infrastructure available to the organisation is sufficient to justify a move to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

10. SAP S/4 HANA's security environment gives the organisation the confidence to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

11. The organisation is confident that the company's data will be protected from unauthorised changes and use in SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

12. The organisation is confident that private and sensitive data will be protected in SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

13. There is sufficient availability of local certified SAP implementation partners/consultants to implement and support SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

14. The organisation regularly trains its employees on new technologies.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

15. The organisation's top management aggressively invests funds in new information technologies.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

16. The organisation's top management is aware of possible risks associated with the migration to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

17. The organisation's top management will be interested in adopting SAP S/4 HANA in order to gain a competitive advantage.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

18. Top management considers the adoption of SAP S/4 HANA as being strategically important.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

19. There are customers that expect our organisation to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

20. There are customers that have encouraged the organisation to migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

21. The organisation might lose customers if it does not migrate to SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

22. Adopting SAP S/4 HANA is a strategic necessity for the organisation.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

23. The organisation has been encouraged by SAP user groupings to adopt SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

24. There are other industry sources (e.g., SAP white papers and SAP implementation partners) that are putting pressure on the firm to adopt SAP S/4 HANA.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

25. The organisation will adopt SAP S/4 HANA because of the deadline for the end of SAP ECC 6.0 support as announced by SAP in 2018.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

26. The organisation is hesitant to adopt SAP S/4 HANA in the cloud owing to restrictive

governmental policies e.g., data privacy and security laws.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

27. The organisation is well versed in the data privacy laws that it must adhere to in adopting SAP S/4 HANA in the cloud.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

28. Existing government regulations on data privacy give the organisation confidence to migrate to SAP S/4 HANA in the cloud.

	1	2	3	4	5	6	7
Response	❑	❑	❑	❑	❑	❑	❑

APPENDIX B: ETHICS CLEARANCE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF BUSINESS SCIENCES ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: CBUSE/1596**
PROJECT TITLE	Factors Affecting Enterprise Resource Planning Migration: The South African Customer's Perspective
INVESTIGATOR	Miss Precious Mushayi
SCHOOL/DEPARTMENT OF INVESTIGATOR	School of Business Sciences
DATE CONSIDERED	5 August 2020
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	MINIMAL RISK
EXPIRY DATE	31 December 2020

ISSUE DATE OF CERTIFICATE 6 August 2020 **CHAIRPERSON** _____
(Neetu Ramsaroop)

cc: Supervisor: Dr Thembekile Mayayise

DECLARATION OF INVESTIGATOR

To be completed in duplicate and ONE COPY returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

_____ 12 / 08 / 2020
Signature **Date**