KNOWLEDGE MANAGEMENT SYSTEMS: AN ADOPTION FRAMEWORK FOR SMALL AND MEDIUM ENTERPRISES (SMEs)

by

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ABSTRACT

Technology is becoming increasingly affordable and accessible through advances in innovation. At the same time, valuable organisational resources are moving from tangible (e.g., steel) to intangible resources (e.g., knowledge). For this reason, knowledge is viewed by many scholars as a sustainable competitive advantage.

To compete successfully in the knowledge economy, organisational knowledge should be appropriately managed through management practices encompassing the creation, storage, retrieval, transfer and application of knowledge using IT systems. The combination of hardware and software to drive knowledge management (KM) is known as a knowledge management system (KMS).

The literature has consistently acknowledged the high failure rates of technology adoption in organisations. It can have devastating consequences for small and medium enterprises (SMEs) as they have fewer resources to recover from KMS adoption failure. Equally important is the fact that SMEs contribute substantially to the gross domestic product and employment of national economies worldwide. The same is true for South African SMEs.

Given the picture of KM in the SME context, it is important to investigate potential factors that can lead to improved KMS adoption in SMEs. As scholarly literature on KMS adoption in SMEs is limited, this study could contribute uniquely to the body of knowledge focused on these factors. Within the Technology-Organisation-Environment (TOE) framework, Diffusion of Innovation (DOI) and critical success factors (CSF), the study constructed a framework for KMS adoption in SMEs.

After constructing a preliminary conceptual framework from the literature, data was collected using a two-phase approach. In phase one, four mini focus groups comprising four SMEs each were interviewed. The thematic analysis revealed eight themes that expanded the existing framework. The purpose of phase two was to validate the framework developed in phase one through face-to-face or online discussions with six SME subject matter experts. Phase two identified five themes that further confirmed and strengthened the framework. The study contributed on a theoretical, empirical and practical level. Having identified several key factors for KMS adoption, the framework

aims to improve the use of KMS in SMEs by employees and, as a result, SME performance and sustainability. Future research could condense or identify additional factors to test the framework developed in the study. In addition, the framework could be tested on specific industries or with larger sample sizes.

Keywords: Small and Medium Enterprises (SMEs); Technology Adoption; Knowledge Management Systems (KMSs); Technology–Organisation–Environment (TOE) Framework; Critical Success Factors (CSFs)

Publications

The following publications emanated from this research:

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DECLARATION

Student No: 62173812

I, Werner Richardt van Zyl, declare that Knowledge management systems: an adoption framework for small and medium enterprises (SMEs) is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. I further declare that I submitted the thesis to originality checking software and that it falls within the accepted requirements for originality. I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

4 November 2022

SIGNATURE **DATE**

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“If I have seen further, it is by standing on the shoulders of giants.”

– Isaac Newton

Werner R. van Zyl

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CHAPTER 1: INTRODUCTION TO THE STUDY

This chapter aims to present an overview of the study by describing the context of the study. The philosophical foundation of the research follows after a background on the theory of work, technology and knowledge management systems. After that, the research design, rationale and contribution are outlined. Finally, the ethical considerations are summarised.

The following convention was used for tables and figures are as follows:

x.y

where

x = Chapter number
y = Table/Figure number

1.1. Background of the study

Information technology permeates every aspect of a human's personal and work life. Cell phones, Wi-Fi, routers, computers, servers, hard drives and other tools allow people and businesses to be connected almost constantly to electronic devices that send data and information instantaneously between devices via the internet. These electronic connections allow people at work to communicate by sending data over the internet at breakneck speed and quantity. Technology has changed the world of work forever (Friedman, 2016). The dynamics between work and technology should be actively managed in organisations to maintain orderly processes and procedures. Without systematic methods of managing information and knowledge in the organisation, employees work less efficiently since sense-making requires more time and effort. Conversely, if organisations could convert information into knowledge, thereby managing their institutional knowledge, employees could work more efficiently and effectively on their tasks (Mishra, 2019).

1.2. Digital transformation

As a shift occurs to a more digital world, organisations are expected to grow their infrastructure flexibility and improve their resource utilisation for survival (Tajudeen, Nadaradajah, Jaafar & Sulaiman, 2021; Ylinen & Pekkola, 2019). The status quo is no longer sufficient, and the pace of innovation is accelerating, spurred on by new technologies and ever-evolving customer needs (Farr, 2021). Unfortunately, the speed of change has outpaced many people's ability to adapt to new technologies (Chamberlain, 2021; Friedman, 2016).

The COVID-19 pandemic has brought tremendous change to the adoption of digital technologies, accelerating it by several years as people had to work from home. The changes in organisational structures and automated processes that result from these digital technologies are called digital transformation (Hess, Matt, Benlian & Wiesböck, 2016).

For many decades, organisational change and implementation of digital technologies had a track record below 50% which has not changed in recent years (Decker & Clear, 2012; Jones-Schenk, 2019; McKinsey, 2020; Ren, 2019). However, with this rapid increase in knowledge, it is imperative to keep track of new findings and processes that can improve business efficiency to filter signals from noise.

The traditional economy has been characterised by full-time employment, where employees focus on building their careers and staying loyal to their employers for many years or even decades. However, in recent years, this career model has been turned on its head, with technology as the primary catalyst. The gig economy is characterised by the recruitment of contractors on a temporary, ad hoc basis (Investopedia, 2018), while the COVID-19 pandemic has accelerated the work-from-home and hybrid working models (Bick, Blandin & Mertent, 2021). As a result, workers have become more flexible and can easily work for different companies in the same industry worldwide (including competitors). Therefore, it is paramount that SMEs retain existing knowledge and ensure that the appropriate knowledge management tools and practices are in place to gain

better insights than competitors. In response, Garba, Salleh, Hafiz, Nasidi and Baker (2022) projected that KM practices positively affect SME sustainability.

The world of freelancing has already unrecognisably changed the work landscape. Today, almost half (46.5%) of the world's population is self-employed (ILO, 2020). In the United States, multiple career changes are already becoming the rule (United States Bureau of Labor Statistics, 2020) rather than the exception, something to be expected rather than frowned upon. What has become known as The Great Resignation has led to millions of people globally resigning after the Covid pandemic. The consequence of such a paradigm shift is that employees display a greater chance of taking their knowledge built up from experience with them when they leave the organisation. For SMEs, this reality of knowledge loss has far more significant consequences as their resources are more constrained than large organisations. As a result, employees that resign leave a knowledge gap of experience that could have been an asset to the organisation (Ragab & Arisha, 2013). As KMSs are custodians of institutional intellectual capital, the resignation of an employee from an SME will leave a knowledge void insofar as it concerns the procedures and processes, both implicit and explicit for tasks. With a shift towards tertiary industries involving a lot of knowledge work, it might be prudent of SMEs to consider their KMS practices, especially in SMEs. SMEs, despite their scale and resource disadvantage, they are still competing with large organisations with vastly more access to capital to leverage KM practices. Individual effects of resignations from a KM perspective include the need for personal KM technologies. At an organisational level the intr-organisational knowledge flow, reduced relational capital and reduced knowledge flow are among the considerations SMEs need to take to consider (Serenko, 2022).

Recently, there has been a general disregard for formalising knowledge through knowledge management systems (KMSs) and an overreliance on human memory or tacit knowledge (Cerchione & Esposito, 2017). Yet, given these constraints, the digital change forced upon all organisations has also provided SMEs access to many technologies that were out of reach just a few years ago.

1.3. A brief history of work

Civilisations have been building majestic structures for at least three thousand years, stretching from the pyramids of Giza, the temple at Petra and the Aswan Dam to the Eiffel Tower. All these structures involved the use of technology. What it required vastly more of is work. Work was defined by Gini (1998) as whatever we do to earn a living and therefore maintain a particular lifestyle. Work forms an integral part of a person's identity (Hetschko, Knabe & Schöb, 2021).

In recent years, however, there has been a move due to artificial intelligence (AI) to automate the work traditionally done by people. The American technology conglomerate and e-tailer Amazon has invested billions of dollars in AI and automation, thereby replacing humans with machines, much to the disappointment of Galloway (2017). By the end of 2017, Amazon added over 23 million square meters of warehouse space and 80 000 robots in its warehouses (Kim, 2018).

Given these points, technology has brought about unprecedented change that, should the current trend continue unimpeded, will bring about more significant technological innovation and integration, blurring the line between the work of man and machine (Friedman, 2016). Nonetheless, the crucial point is that, for the foreseeable future, technology and man (work) will co-exist because there is no current substitute for the *interaction* between man and machine. It is, in fact, a unique contribution of this study that not only the human and technological factors influencing technology adoption were studied, but also the interaction of the human and machine.

It has become clear from the discussion above that the evolution of technology and the accelerating pace and integration of technology have direct implications and challenges for the world of work. The very definition of work has not escaped the fourth industrial revolution. According to Burrows (2017), the issue of technology is not the accompanying job losses but rather how the term 'work' will be defined. The intellectual capital inside employees' heads serves as a competitive advantage against the advent of the age of automation.

1.4. The development of SMEs

The definition of “small” and “medium” enterprises is a relative construct that varies from country to country (Massaro, Handley, Bagnoli & Dumay, 2016), making it hard to compare studies directly with each other. Small and medium enterprises (SMEs) differ in many respects from larger organisations, such as their constraints on resources (Herrmann, Brandt-Hermann & Jahnke, 2007; Sytnik, Kravchenki, 2021) and management proficiency and actions (Cohen & Kaimenakis, 2007). Generally, definitions are based on the number of employees and the value of sales or asset value (OECD, 2004; Steenkamp & Kashyap, 2010). Some metrics for defining SMEs include stock turnover, capital assets, enterprise size, labour skill, and legal status (Abor & Quartey, 2010). The definition of SMEs for this study is based on the Small Business Amendment Act of 2003 (South Africa, 2003), which stipulates that size were used to define SMEs. Table 1.1 outlines the different employee sizes for the different categories within SMEs as per the Small Business Amendment Act of 2003.

Table 1.1 Defining SMEs in terms of number of full-time employees (Source: Small Business Amendment Act of 2003)

Sector	Size	Number of full-time employees
Business services	Medium	200
	Small	50
	Very small	20
	Micro	5
Personal services	Medium	200
	Small	50
	Very small	20
	Micro	5

Thus, for this study, SMEs were defined as businesses that employ more than 50 people (small) and less than 200 people (medium).

1.4.1. The role of SMEs in the SA economy

SMEs constitute 98% of the formal sector in South Africa, employing between 50% and 60% of the labour force across all sectors. SMEs are also more vulnerable than large organisations to crises such as cash flow problems or resource shortages. In a survey conducted at the beginning of Covid in July 2020 by the management consultancy McKinsey 2020, 40-60% of respondents believed they would make a loss of 5% or more in the current financial year (LaBerge, O'Toole, Schneider & Smaje, 2020). As were asserted in this study, large organisations do not scale proportionally. Therefore, they are better able to absorb financial shocks than SMEs for more sustained periods that would annihilate smaller enterprises.

SME failure in South Africa has been consistently above 70% and represents one of the highest failure rates in the world (Friedrich, 2021). According to Cova Advisory, an advisory consultancy, this is partly due to very few SMEs receiving government support and assistance.

The 2020 CHAOS report by the Standish Group estimates the failure rate of software projects to be close to two-thirds of all projects (Dominguez, 2020). However, in South Africa, the picture is even less rosy. In South Africa, IT projects are estimated to fail at an average rate of 28% (Marnewick, Erasmus & Joseph, 2017). In other words, more than 70% of projects add little to no value to the organisation. With an IT expenditure of over R200 billion, such IT failures will likely equate to substantial financial losses for SMEs. Thus, factors contributing to the failure rate of IT projects in SMEs must be addressed.

1.5. The evolution of technology

The quintessential mental image people conjure up when they think of technology is likely an object resembling a computer with a screen and user interface. However, as defined

above, many everyday objects can be considered technologies: tables, chairs, pens, writing and paper.

The human mind, as evident from its limited size, can store only a limited amount of information at any given time. Furthermore, on average, it can keep in its ‘working’ memory ‘7 plus or minus 2’ ‘chunks’ of information (Johnson, 2014). Twelve thousand years ago, the Agricultural revolution brought with it the domestication of plants and animals, leading to people living together in progressively larger groups (Harari, 2014). This social connection naturally led to increased information and a tax on a person’s memory.

To solve the problem of exponentially increasing information and limited brain size, the Sumerians of Mesopotamia (now modern-day Iraq) about 3500—3000 years ago invented a new system. It allowed them to offload the information into structures within their external environment, extending their minds far beyond the skull's capacity (Rowlands, 2010). This ‘data-processing’ technology is today known as writing.

Technological expansion and innovation has naturally followed a non-linear trajectory, aided by reinforcing feedback from existing technology, increasing the pace of acceleration even further (Waldrop, 2019). Ray Kurzweil, director of engineering at Google, asserted this trend: “we’re entering an age of acceleration. The models underlying society at every level, which are largely based on a linear model of change, are going to have to be redefined” (Kurzweil & Meyer, 2003).

The first industrial revolution occurred around 1760 - 1840 with the introduction of the steam engine (invented by Thomas Savery) (Schwab, 2017). The second industrial revolution (from the late 1800s to early 1900s) gave rise to electricity, and in particular alternating current (invented by Nikola Tesla) and the assembly line (invented by Ransom E. Olds). The bulky mainframe computer introduced the third industrial (digital) revolution in the 1960s, followed by the personal computer (PC) or ‘desktop’, the development of the internet in the 1970s, and the invention of the Web by Tim Berners-Lee in 1990. The current fourth industrial revolution can be described as “fusion… and their interaction across the physical, digital and biological domains…” (Schwab, 2017: 12). Products of

the fourth industrial revolution include machine learning, the Internet of Things (IoT) and artificial intelligence (AI). Only a few genuinely new technologies are being developed today. Genuinely innovative inventions lie in the property of emergence. This new property is created by combining two or more existing technologies, for example, drone technology and infrared imaging, to monitor plant health (Mahajan & Bundel, 2016).

Growth where a change in one quantity leads to a nonlinear increase in another quantity, is called a power law (Rickles, 2007). Fuelling the nonlinear, accelerated change is the doubling of computing power approximately every two years, known as Moore's Law (Friedman, 2016). In 2007, a technology revolution in miniature took place: a revolution in how people use cell phones was introduced (Apple iPhone). A collaborative software platform (GitHub) was introduced where developers shape the future of software and contribute to an open-source community (Wachs, Nitecki, Schueller & Polleres, 2022). In late 2006, the largest social network (Facebook) was born. In addition, a microblogging website (Twitter) scaled globally. Google acquired YouTube (late 2006); Google developed the smartphone platform (Android), and a short-term lodging company (Airbnb) was conceived. IBM built a computer with the ability to answer questions posed to it in natural language (called Watson). A leading microchip company (Intel) introduced an overhaul in their transistor technology (Friedman, 2016).

As is evident from the examples above, the pace of change is emerging at different speeds from different directions, making it harder for humans to adapt to their environment. According to AI scientists at Google X, the rate of change has already outpaced the human's ability to adapt (Chamberlain, 2021; Friedman, 2016). Further, technological advances have become more integrated, with data and information as the currency.

The Merriam-Webster Dictionary defines technology as "the practical application of knowledge, especially in a particular area" (Merriam-Webster, 2019). It can therefore be argued that today's organisations deploy technology to simplify the application of knowledge. Similarly, to arrive at what humans generally see as 'technology', data (bits) are processed to create information, thereby increasing its utility. Information can be seen as providing answers to questions. Knowledge adds another level by providing answers

to specific ‘how-to’ questions (Ackoff, 1989). For example, how can human knowledge be offloaded to create more free memory? Knowledge provides the answer by developing and designing an information system that stores what is inside the human mind.

1.6. Theoretical paradigm: complex systems

The concepts from complexity theory identified as relevant to the study are openness, self-organisation, feedback loop, emergence, far from equilibrium and synergy. Openness refers to the flow of information and matter into and out of a system (Gharajedaghi, 2011). Feedback loops can either cause elements in a system to balance the interaction of elements or reinforce those elements to cause more of that behaviour. Self-organisation is the spontaneous rearranging of system elements into a system (Arnold & Wade, 2015). As the elements rearrange, new properties emerge that are not present at lower levels. This process is known as emergence. Synergy refers to system elements interacting in an interdependent way to augment the connection between the elements. Systems can fluctuate between more ordered to more disordered (Rickles, Hawe & Shiell, 2007). For example, when ice melts, the crystalline structure moves from an ordered state to a more disordered state as the arrangement of atoms become more random. When a system functions at the boundary between order and disorder, a complex system is said to be ‘far from equilibrium in a state of bounded instability’ (Dosi & Roventini, 2019; Turner & Baker, 2019). These concepts will describe the final KMS adoption framework in terms of complexity theory.

1.7. Technology adoption models

Various authors have studied technology adoption over the last few decades (Davis, 1989; Venkatesh, Morris, Davis & Davis, 2003; Laumer & Eckhardt, 2012; Venkatesh, Thong & Xu, 2012). Davis' (1986) Technology Acceptance Model (TAM) was the first successful theoretical model that aimed to predict the acceptance of technology. The TAM caters for technology adoption by individuals in a non-specific context. It is, therefore, not explicitly geared towards KMS adoption in organisations, although various

information system (IS) models have been put forward for specific contexts (Venkatesh & Bala, 2008). Since its introduction, TAM has been further extended in subsequent studies, which include the Unified Theory of Acceptance and Use of Technology (UTAUT) and its variant (UTAUT 2). UTAUT 2 can explain up to a seventy-four percent variance in behavioural intention. According to Venkatesh *et al*. (2003), the UTAUT had reached its maximum predictive ability for technology acceptance.

The abovementioned models emphasise individual-level adoption and thus lack organisational-level adoption aspects. Therefore, Chapter 3 deals more in-depth with organisational-level and integrated-level adoption models considered part of the final framework.

One of the earliest KMS adoption model reviews was conducted by Kaldi, Aghaie and Khoshalhan (2008). The authors acknowledged that numerous factors influence KMS adoption on individual and organisational levels. Therefore, individual-level models often involve the TAM as a theoretical framework. Kaldi *et al*. (2008) proposed several KMS adoption models to be studied empirically, including numerous factors leading to adoption intention as the dependent variable. They concluded that many factors influence KMS adoption, such as perceived characteristics of the system, adopter characteristics, organisational characteristics, mimetic pressures, coercive pressures, normative pressures, and environmental turbulence. Organisational factors include culture, subjective norms and incentives and top management support.

Other models were developed to examine the factors influencing KMS adoption, such as those by Alatawi, Dwivedi, Williams and Rana (2012), Lin (2013), Tsai and Hung (2016), Shrafat (2018) and Tounkara (2019). In addition, the factors hypothesised by Sharafat (2018) were validated as part of the model. However, there were still limitations based on the number of factors tested and the small sample size, thereby limiting generalisability. Typically, there has been limited research on technology adoption among SMEs (Atan & Mahmood, 2019); therefore, KMS adoption research in SMEs is also limited. Furthermore, inconsistent findings have been reported on the influence of specific factors in technology adoption. Omran *et al*. (2021) recently asserted that, in particular, individual and environmental adoption factors in KMS adoption are limited. This study will contribute to

the extant literature by identifying individual and environmental factors influencing KMS adoption. All hypotheses regarding organisational, individual, management support and technological factors were found significant for a KMS adoption model developed among academics in Nigerian universities by Salami and Suhaimi (2019). Given the plethora of technologies used by organisations for the management of its documents and processes, a formal definition of KMS is in order.

1.8. Defining knowledge management systems

One way to think about the relationship between data, information, and knowledge is in terms of the data-information-knowledge-wisdom (DIKW) hierarchy (Frické, 2019). As they are part of a hierarchy, these entities build successively on top of each other, starting with the most basic entity at the bottom tier - data and building up to the final tier - wisdom. Therefore, to simplify understanding these relationships, the best way should be to define one concept in terms of another. Table 1.2 summarises the differences between data, information, knowledge and wisdom as defined in the literature.

Table 1.2 Definitions used in the literature to distinguish data, information, knowledge, and wisdom (Source: Researchers' own)

Author	Concept	Definition
Fain, 2017	Data	”A set of characters or values, usually numerical, that has been collected and coded into a form that a computer can process for purposes of analysis” (p.151)
Edewor, 2021	Information	“Information can be defined as already processed data that can be used for quality decision-making” (p.1)

Author	Concept	Definition
Larasati and Irawan, 2019	Knowledge	“The capability to solve a problem” (p.4)
Van Meter, 2020	Wisdom	“Wisdom can be defined as the application of collected knowledge to generate an understanding of humanity and human society and its environs to guide one’s actions and improve one’s life” (p.76)

Traditionally, knowledge has been defined as true justified beliefs (Engqvist, 2019; Nonaka & Takeuchi, 1995). However, the management of knowledge within organisations uses different media. When IT-based systems are used to augment and assist knowledge processes (e.g., creation, storage, retrieval, transfer and application), it is known as knowledge management systems (Alavi & Leidner, 1999). After consulting the relevant literature, KM is defined as “the process to acquire, create, codify, apply, and protect knowledge within the organisation”. A KMS is thus the IT-based system used for these KM processes.

As the study indicated in Section 1.3, SMEs contribute significantly to employment and income generation for the South African economy.

A common mistaken belief is that KM is a practice privy only to large organisations. With the advent of, among other things, low-cost, cloud-based KMSs do not require significant capital expenditure. SMEs can also take part in the knowledge economy. Nowadays, an essential task for SMEs is the management of KM processes (Centobelli, Cerchione, & Esposito, E., 2019). A recent survey suggests that only 18% of SMEs use KM tools and practices effectively and efficiently. There seems to be a need to investigate further adoptions of KMSs by SMEs (Centobelli *et al*., 2019).

1.9. A system-theoretical view of KMS adoption

This section describes the frameworks appropriate to review within a systems theory view of KMS adoption.

1.9.1. The technology-organisation-environment framework

The technology-organisation-environment (TOE) framework explains organisation-level adoption decisions of technological innovations in terms of three perspectives: technology, the organisation and the environment (Gangwar, Date & Raoot, 2014). An advantage of the TOE framework is that it is free from organisational-size restrictions (Wen & Chen, 2010). The technological context includes both the existing technologies and the availability of new technologies applicable to the organisation. The organisational context primarily refers to measures describing the organisation, such as size, scope and available resources (Tornatzky & Fleischer 1990). Environmental elements are usually beyond the organisation's control, including pressure from competitors (Tornatzky & Fleischer, 1990; Wang & Wang, 2016; Adade-Baofo, 2018).

The TOE framework has in the past proven its rigour in its application to many innovations, including KMSs (Kumar, Singh & Swain, 2022; Awa & Ojiabo, 2016; Lee, Wang, Lim & Peng, 2009). The TOE is a valuable framework given the objectives of the study. However, the TOE has some limitations, as pointed out by Gangwar, Date and Raoot (2014), such as the TOE not being a well-developed theory and the major constructs being unclear. The inclusion of individual factors under a human behavioural context is therefore suitable. Furthermore, the theme of holistic, interconnected systems and subsystems that the framework prescribes is aligned with this study's complexity theory, characterised by emergent, non-linear properties with interconnected, interactive and interrelated elements (Waldrop, 2019). in contrast to the linear, reductionist thinking of the Newtonian worldview.

A summary of the TOE framework and Diffusion of Innovation (DOI) theory follows, with a more expansive discussion in Chapter 3.

The importance of the human aspect influencing the use of the KMS is addressed under the label ‘behavioural context’.

1.9.2. The technological context

The technological context refers to all the internal and external technologies at this time available to the organisation (Bhattacharya & Wamba, 2015; Tornatzky & Fleischer, 1990). Three factors often associated with the technology context originate from Rogers’ (1995) Diffusion of Innovation theory. These include relative advantage, compatibility, and complexity (Hoti, 2015; Okour; Chong & Fattah, 2021; Tornatzky & Fleischer, 1990).

1.9.3. The organisational context

The organisational context refers to available resources in the organisation’s possession for adopting innovation. Furthermore, the organisation could have several structures and processes that enhance or inhibit technology adoption (Tornatzky & Fleischer, 1990; Stjepic, Bach & Vuksic, 2021).

1.9.4. The environmental context

The environmental context refers to the domain within which the organisation does business. Factors that influence the external environment include the industry, regulatory environment, rivalry among competitors and technology service providers’ competitive behaviour, and governmental interaction and access to resources (Baker, 2011; Stjepic, Bach & Vuksic, 2021; Tornatzky & Fleischer, 1990).

1.9.5. The human behavioural context

Ultimately it is the individual who is the user of the KMS technology. However, even though technology adoption models and frameworks have acknowledged the role of the individual, a limitation of the TOE framework is that it still neglects the importance of the individual as part of KMS adoption in SMEs (Castricum, 2006; Wang & Lai, 2014). Therefore, this study will explore emerging individual factors.

1.9.6. The Diffusion of Innovation theory (DOI)

The Diffusion of Innovation (DOI) model developed by Rogers (1962) is about the spread of technology through cultures, why it happens and at what rate. The DOI was chosen as a framework is justified as previous studies in the information system literature has demonstrated its value in that domain, especially with the addition of the TOE framework. The most widely used constructs in the DOI are relative advantage and compatibility, amongst others (Hoti, 2015). The DOI has often been used in conjunction with the TOE since both models can be applied. In addition, the DOI provides constructs for application at an individual level, and the TOE provides an environmental context (Baig, Shuib & Yadegaridehkordi, 2019).

Previous findings have indicated that the TOE framework and DOI model are consistent (Senarathna, Wilkin & Warren, 2018; Sadoughi, Khodaveisi & Ahmadi, 2019) when integrating the two schemas to study adoption.

1.9.7. Critical success factors in knowledge management

Wong and Aspinwall (2005) defined CSFs from a knowledge management perspective as “the areas that need to be focused on to ensure successful KM implementation.” Rockart (1979), who conceptualised CSFs, acknowledged that CSFs would differ from one organisation to the next. Though “failure” is a relatively subjective term with diverse possible interpretations, the study has identified a recurring theme within the literature.

Wong and Aspinwall’s (2005) empirical study found that CSF for KM adoption in SMEs comprised eleven (11) factors. After ranking the CSFs in importance, they found (in order of importance) management support, leadership, culture, information technology (IT), and strategy and purpose to be the most salient factors. Management support is often combined with leadership in the CSF literature but is also included as a separate entity.
A meta-analysis by OuYang, Yeh and Lee (2010) identified the same eleven factors as Wong and Aspinwall (2005) and others but went further and categorised the CSFs into individual, organisational, knowledge, KM capability and performance factors.

A systematic review by Ouyang, Yeh and Lee (2010) found considerable overlap with Wong and Aspinwall's (2005) CSFs in their recent, comprehensive literature review over a twenty-seven-year period until 2009. Top management support and leadership were well-cited as important organisational factors in the literature. Rewards, such as extrinsic rewards, promotions and bonuses, were included under organisational factors, whereas in this study, rewards were included under behavioural context. Some salient factors were management support, reward, technology infrastructure, and culture. Utilising qualitative research to interview experts from academia and industry,

Singh and Kant (2008) performed a literature review and interviewed experts to identify the most salient KM barriers based on their driving and dependence power. They found that top management ranked the highest among the nine KM barriers. Other barriers included motivation and reward, organisational culture, and technology infrastructure.

CSFs were categorised as technology, strategic, regulation/policy, and organisational and individual culture by Senuse, Qodarsih, Lusa and Prima (2018) categorised. CSF identified by the authors showed considerable overlap with related literature and included top management support, leadership, rewards and motivation in their list.

Accordingly, the CSFs identified in the literature review appearing to play a significant role in adopting KM systems and practices were management support and commitment, leadership, (organisational) culture, information technology (infrastructure), resources, motivation, reward, and communication.

1.10. Problem statement

Knowledge management (KM) scholars concur that, in the 21st century, knowledge acts as a competitive advantage for organisations (Janus, 2016; Lee & Lan, 2011; Nguyen, Neck & Nguyen, 2011; Wang & Wang, 2016; Wijaya & Suasih, 2020). The consensus includes SMEs (Centobelli *et al*., 2019; Cerchione, Esposito & Spadaro, 2016). It is because KM might be the only competitive advantage (De Geus, 1988) SMEs have when competing with larger organisations and leveraging their knowledge properly (Cerchione et al., 2016). Therefore, their KM should not simply be a scaled-down version of larger

organisations (Kmieciak, 2018; Olejnik, 2013). However, the characteristic of nonlinearity is present in organisations. As a result, small organisations are disproportionately disadvantaged due to the lack of financial and human capital large organisations possess. Therefore, SMEs are less able to deal with financial or resource problems.

Important reasons for SMEs to adopt KMSs include increased productivity, increased sales, growth, employee development, fewer losses, and maintaining institutional knowledge (Edvardsson & Durst, 2013; Wall, 2020). Implementing such a system, however, is influenced by many factors inside and outside the organisation.

Two avenues of research have been identified that deal with factors relevant to adopting technology. The first avenue deals with factors influencing technology adoption in specific and non-specific contexts. Some of these models have successfully explained variances in behaviour intention (Venkatesh, 2000). However, the research is still in its infancy compared to the IT adoption literature. The second research avenue forms part of critical success factors (CSFs). Some CSFs have been relatively well-established in the literature. Meta-analyses list various knowledge management (KM) critical success factors (CSFs) that facilitate successful knowledge management system (KMS) adoption (Saleh et al., 2017). SMEs within which a KMS adoption process fails can incur considerable sunk costs, or even worse, for those most vulnerable SMEs.

It became clear from the discussion above that research on KM adoption models for SMEs containing human behavioural aspects is limited in the current body of literature (. However, this aspect is important to explore because human beings need to engage with technology before adapting to it and adopting it. Furthermore, as far as the author is aware, individual-level and organisational-level frameworks have not been combined in the KMS literature in an SME context.

1.11. Motivation of the study

Triangulating the changing technology landscape and a move towards knowledge as a commodity and competitive advantage, the motivation for the study emerges.

The lack of adoption of institutional technology can have severe consequences for the feasibility of any organisation's profitability. Khazieva, Tome and Caganova (2018) described a KMS failure case study in Turkey in which a new KMS for a large telecommunications organisation failed catastrophically. Considerable costs and resources are involved in implementing and maintaining such systems. Adopting the right knowledge management system (KMS) is crucial to retain and disseminating the acquired knowledge in a company for enhancing productivity and maintaining institutional knowledge (Edvardsson & Durst, 2013; Kamprom, Lertworaprachaya & Lertwongsatien, 2018).

In 2018, South African businesses were expected to spend more than R275 billion on Information technology (Gartner, 2018). However, longitudinal research in South Africa has revealed that IS project success has not improved, and projects are failing at a rate of between 12% and 27%. The 2020 CHAOS report by the Standish Group estimates the software project failure rate to be close to two-thirds of all projects (Dominguez, 2020). In South Africa, the picture is even less rosy, where IT projects are estimated to succeed at an average rate of 28% only (Marnewick, Erasmus & Joseph, 2017). Recently, Australian food chain Woolworths paid $200 million to convert their current enterprise resource planning (ERP) to SAP. However, after supply disruptions, severe reporting errors and the layoff of hundreds of its staff, the implementation was written off as a failure at the cost of $766 million (Miller, 2017).

Successes in information systems implementation have also been documented. For example, Halawi, McCarthy and Aronson (2017) cited two successful knowledge management system (KMS) implementation case studies. The one involved conglomerate Siemens AG, which implemented a web-based KMS utilised as a repository for increasing collaboration and global competitiveness. Another KMS project was from Titan Industries, a global watchmaker. Success factors identified were a defined business need, management support and involvement, a demonstrated return on investment, and usability demonstrated through the web interface with knowledge sharing as part of the organisational culture. The discussion above provided various examples of knowledge management system failures in the literature. Thus, a lack of KM processes and poor implementation can dramatically affect organisational performance.

The consequences for organisations that fail to have successful adoptions can be devastating. Not only does KMS adoption failure lead to financial losses, but the system either needs to be adapted or a new system adopted for implementation, adding further costs and resources (e.g., time) to the budget. Other consequences of KMS failures include declining market value, disputes around responsibility for financial losses (Dwiveldi *et al*., 2015), increased sick leave and increased staff turnover (Laumer, Maier, Weitzel & Eckhardt, 2012).

With the move to a digital Information age, technology has become the default to manage organisational knowledge. Therefore, technology is imperative for knowledge management in support of the achievement of organisational goals (Wang & Wu, 2020). However, adopting new technology to manage the organisation's knowledge sufficiently may involve numerous success factors to be considered. Accordingly, technology adoption models and critical success factors (CSFs) can provide insight into why technology is adopted and which factors are critical for success in KM(S) adoption.

1.12. Research question and objectives

The research question was formulated as follows:

How can a theoretical framework for the adoption of knowledge management systems in SMEs be conceptualized?

1.13. Theoretical objectives

The theoretical objectives (TO) of the study were to

TO1: identify concepts from critical success factors (CSF) literature as it relates to KMSs.

TO2: compare the concepts of KM adoption theories with concepts of CSFs.

TO3: describe selected concepts from complexity theory as they relate to the study.

TO4: construct a preliminary theoretical framework for the adoption of KMSs in SMEs using the Technology-Organisation-Environment (TOE) framework, Diffusion of Innovation (DOI) Theory and Critical success factors.

1.14. Empirical objectives

The empirical objectives (EOs) of the study were to:

EO1: investigate differences in adoption factors and CSFs regarding KMS adoption.
EO2: describe the influence of KMS self-efficacy on KMS adoption in SMEs.
EO3: describe the influence of managerial and leadership behaviour on KMS adoption in SMEs.
EO4: determine the influence of technology factors on KMS adoption.
EO5: describe the influence of the environment on KMS adoption in SMEs.
EO6: construct a final framework for the adoption of KMSs for SMEs.

A unique contribution of this study is integrating the CSF literature and a human behavioural dimension, specifically selected positive psychology concepts with the technology adoption literature to describe the adoption of KMSs of SMEs.

The following section aligns an abbreviated literature review concerning the aspects explored in this study with the research objectives.

The technology adoption literature is fragmented between technology adoption and critical success factors in the KM field. Firstly, technology adoption models were reviewed to identify key factors for inclusion in those models. Secondly, the critical success factors (CSF) were analysed to identify unique and overlapping factors. For this study, to facilitate the integration of the two domains of technology adoption, a well-researched framework was adapted to address the research question within the knowledge management context. Table 1.3 below provides an alignment matrix between the various theories, research objectives and the relevant literature. Considering the vast literature covered,

the purpose of the table is to summarise the main authors consulted for the theories and frameworks.

Table 1.3 Alignment of theories to objectives and literature (Source: Researchers' own)

Theories or frameworks	Objectives	Author(s)
Critical success factors	TO1, TO2, TO3, EO1, EO10	OuYang & Lee (2010); Qodarsih, Lusa and Prima (2018); Ram & Corkindale (2014); Sedighi & Zand (2012); Shaul & Tauber (2013); Sensuse *et al*. (2018); Skoumpopoulou & Moss (2018); Wong & Aspinwall (2005)
TRA, TPB, TAM, UTAUT	TO2, TO3, EO1	Ajzen, 1991; Davis, 1989; Venkatesh *et al*. (2003); Venkatesh *et al*. (2012)
TOE framework, DoI Theory	TO6, EO10	Rogers (2003); Tornazky & Fleischer, (1990)
System theory/ Complexity theory	TO4	Capra (1996); Waldrop (2019); Von Bertalanffy (1968)
Self-efficacy; KMS self-efficacy	TO5, E02	Bandura (1977), Tan, Ramayah & Popa (2017)

1.15. Ontology and epistemological foundations of the study

Ontology pertains to the nature of reality and what we can know about it. Ormston, Spencer, Barnard and Snape (2014) distinguish between reality being independent of human perceptions, a shared social reality or a reality only based on context. This study includes an interpretivist ontological paradigm accorded to humans as actors in social

roles. Reality is therefore based on a shared social reality, which gives it unique meaning (Bryman, 2016).

Epistemology concerns the theory of knowledge – whether there is a difference between thinking something is true and knowing something is true (Nagel, 2014). The epistemological paradigm of this study asserts that knowledge is a social construction. Interpretivism as an epistemology asserts knowledge is based on exploring and understanding the research participants' social world and emphasises meaning and interpretations in a particular context (Al-Saadi, 2014). Since this study aims to discover the underlying emergent patterns of the meaning of activities and events (Saunders, Lewis & Thornhill, 2015), it aligns with a qualitative research design is best aimed to answer the research question.

1.16. Research design

Qualitative approaches aim to collect as many different "voices" from participants as possible due to the interdependent, complex and multi-faceted nature of reality guided by an interpretivist philosophical stance (Järvinen & MikMeyer, 2020; Justesen & Mik-Meyer, 2012). This approach is thus in line with the research question of the study.

The research were conducted in two phases. A purely qualitative, multimethod methodological approach were followed as it is best suited to answer the research question. A sequential study was chosen for the reason that Phase 2 is dependent on the data collected in Phase 1. Typically, focus group discussions, or mini focus group interviews follow face-to-face interviews sequentially in a multimethod study (Dzimba & van der Poll, 2019). However, in this study, Phase 2 were used to validate the findings of Phase 1 and, therefore, not be conducted in reverse (Mohajan, 2018). Within the context of this study, qualitative methods allow novel themes to emerge and thus answer emergent questions with sequential methods adding to the robustness of the findings (Morse, 2010). Multimethod approaches add an in-depth understanding, unbiased analysis of findings and stronger trustworthiness not present in either method alone (Abramovich, 2017; Kerins et al., 2019; Tierney et al., 2019).

1.16.1. Population and sample

This study is performed within the SME environment in South Africa. According to the Small Enterprise Development Agency, there were slightly more than 2.3 million SMEs in South Africa in 2020 (Small Enterprise Development Agency, 2021). It indicates a decline of 10.9% from 2020. SMEs were chosen as these organisations often employ knowledge workers and are prone to future technological disruption (Ferres, 2019).

If knowledge serves as a competitive advantage as indicated in this study, it is all the more important for SMEs to maintain institutional knowledge to remain competitive. For this study, the population to be studied include SMEs that are defined as SMEs in South Africa, that is, an organisation with less than 200 employees. As mentioned in the previous section, SMEs make up the majority of businesses in South Africa and contribute the most significant portion towards the country's gross domestic product. As of this writing, the Coronavirus pandemic has swooped across the globe at an unprecedented speed, causing many countries, including South Africa, to place their citizens and businesses under total or partial lockdown. The economic impact of the virus' effect still needs to be determined, but the effect of the lockdown on SMEs has been immediate (Bick, Blandin & Mertens, 2020). With a dramatic slump in GDP growth, recovery is expected to take a long time. However, competitive resources, including knowledge, can still be used to earn revenue through, for example, consulting over the internet. It highlights the competitive advantage knowledge can have for an SME during times of crisis.

1.16.2. Population sampling

Purposive sampling is a non-probability, qualitative sampling technique that were used as the sampling strategy (Saunders et al., 2015). This technique will allow the study to intentionally sample participants and subject matter experts best suited to answer the research question under consideration (Creswell, 2013). Purposive sampling is based on the assumption that participants hold different and important views of the topic under discussion (Campbell et al., 2020). The decision to opt for purposive sampling is supported by studies that utilised this strategy in a knowledge management context as this sampling method was best poised to answer the research question (Okanga, 2017; Siregar, Puspokusumo & Rahayu, 2017).

1.16.3. Sample size

For this study, four mini focus group interviews were held in Phase 1. Mini or small focus groups consist of four to six participants rather than six or more (Menary et al., 2021). As part of Phase 2, six additional face-to-face interviews were conducted with subject matter experts. The latter stage will act as a validation method for the framework from the literature and mini focus groups and thereby add to the face validity and trustworthiness of the study.

Phase 1: SME mini focus group interviews

Phase 1 will involve mini focus group interviews with purposively sampled SMEs.

Phase 1: Unit of analysis

Phase 1: SMEs in South Africa who have already adopted or intend to adopt KM technology

Phase 1: Population and sample frame

Phase 1: Decision-makers in SMEs in South Africa where the organisation either currently uses a KMS or where participants previously used a KMS.

Phase 1: Method of data collection

In line with previous research (Dzimba & van der Poll, 2019; Mbedzi, van der Poll & van der Poll, 2018), after reviewing the literature and developing a theoretical framework, mini focus group interview data were collected. Interviews were combined with field notes to reveal the participants' verbal reflections on their situation so that their reflections were part of the reasoning process when analysing data.

SMEs were recruited using personal and telephonic contact, adhering to the selection criteria based on purposive sampling. Data were collected employing semi-structured interviews. The researcher will conduct all interviews, which were recorded via an electronic device to prepare for data analysis. In addition, the study will take notes during

the interviews as an added contingency measure and compare notes with transcripts afterwards.

The face-to-face interviews were conducted at the location of the SME being interviewed or online via teleconference technologies (Zoom, Microsoft Teams, Google Hangout). The participants will also be selected according to the purposive sampling strategy followed for this study. Such a strategy allows the study to locate the best participants to address the research questions. In addition, in the case of face-to-face interviews, the study will ensure that the necessary Covid-19 regulations are adhered to (e.g., sanitation, face masks and social distancing).

The researcher used an interview guide containing open questions in the face-to-face interviews to guide the discussions (see Appendix A). Data was recorded verbatim and transcribed by the researcher by hand.

Phase 1: Method of data analysis: Thematic analysis

After data collection, data analysis were performed through thematic content analysis. Thematic analysis is a systematic approach whereby the study aims to identify emerging themes from the interviews and includes all forms of communication, including spoken words, texts and observations. (Guest, MacQueen & Namey, 2014; Macguire & Delahunt, 2017). It depends on counting word frequency and coding frames based on measurements from the collected data (Braun & Clarke, 2021; Byrne, 2017; Herzog, Handke & Hitters, 2019). Collected data were analysed using computer software, such as Atlas Ti. Data analysis will involve coding and categorising the data, which were used to identify patterns of meaning from which the themes were derived (Saldana, 2021).

The approach followed for data analysis was based on Braun and Clark's (2006) six-phased approach to thematic analysis, namely, the study familiarising himself with the data, coding the data, identifying themes, reviewing themes, defining and specifying themes and finally producing the thematic report. The themes were subsequently integrated as part of the preliminary theoretical framework developed from the literature.

Phase 2: Assessment of the face validity of the proposed framework

Phase 2 will utilise the themes collected in Phase 1 to validate the findings against data collected from personal face-to-face interviews.

Phase 2: Unit of analysis

Phase 2: Individual subject matter experts in South Africa in the field of technology adoption.

Phase 2: Population and sample frame

Phase 2: Subject matter experts with experience in the technology adoption field.

Phase 2: Method of data collection

Subject matter experts were recruited employing personal and telephonic contact that adhered to the selection criteria for the study based on purposive sampling. Data was collected using a semi-structured discussion guide with open questions in personal face-to-face or online interviews. The researcher recorded all interviews electronically to prepare for data analysis. In addition, the study took field notes during the interviews as an added contingency measure.

The interviews were conducted face-to-face at the organisation's location or online via teleconference technology (e.g., Microsoft Teams). Participants were selected according to a purposive sampling strategy, allowing the study to locate the participants best suited to address the research question. In the case of face-to-face interviews, the study had to ensure that the necessary Covid-19 regulations were adhered to (i.e., sanitation, face masks and social distancing).

Phase 2: Method of data analysis

Data analysis was performed through thematic content analysis. Similar to Braun and Clark's (2006) six-phased approach for thematic analysis followed in Phase 1, data was coded, categories identified, and themes defined, culminating in a final discussion report of themes. The report entailed discussions on validating the identified themes in Phase 1 and new themes that might lend credence to the already created themes. A framework was constructed in the final analysis stage, integrating the factors for KMS adoption in Phase 1 and Phase 2.

The collected data was analysed using Atlas Ti application software. Data analysis involves coding and categorising the data to identify patterns of meaning from which the themes were derived (Saldana, 2021).

1.17. Rationale and contribution of the study

Previous research suggested the existence of significant challenges facing KMS adoption, especially the factors contributing to KMS success (Zarilla, Ismail & Rosman, 2022). Furthermore, a small number of studies have investigated KMS adoption outcomes in SMEs (Shrafat, 2018). A general misconception is that the practice of KM is privy to large organisations only. A survey by Contobelli et al. (2018) suggested that only 18% of SMEs use KM tools and practices effectively and efficiently. Yet, KM processes signify a vital task for SMEs. Thus, there is a need to investigate further adoption of KMSs by SMEs (Centobelli *et al*., 2019; Shrafat, 2018). This study will complement the extant literature by adding emergent factors to the KMS field as they pertain to SMEs.

The human factor element (e.g., beliefs and motivations) refers to the people component and is an important dimension for any organisation's success in KM (Zarilla, Ismail & Rosman, 2022). The TOE framework lacks a human behavioural context; therefore, the inclusion as part of the framework is warranted. The inclusion of positive psychology concepts, such as self-efficacy, has also been neglected in research, although it has received attention in different conceptualisations in the technology adoption literature.

There has been limited research on CSF in KMS research, although previous studies have confirmed its importance in this field (Reddy, Reddy & Jonnalagadda, 2022). This study provides a unique contribution by combining CSF research into KMS as part of an integrated model.

Finally, although studies in the past have investigated information systems (IS) literature using a complexity lens as a theoretical paradigm (Mcbride, 2005; McElroy, 2001; Tomasino, 2013), the study could not find previous scholarly works or research focusing on KMS adoption in particular.

1.18. Ethical considerations

Ethical concerns are central to the research process. Throughout the study, the anonymity of respondents and subject matter experts was ensured. Where anonymity could not be guaranteed, such as in the mini focus groups, sensitive information was redacted. All respondents were formally informed and invited, and participation occurred voluntarily (see Appendices C, D, and E). The research purpose was explained to the participants in the invitations and repeated before the mini focus group and face-to-face interviews. All data were treated as strictly confidential and saved on cloud software for five years before it is deleted. At the participant's request, the research results were made available after the completion of the study.

1.19. Conclusion

This chapter set the scene for the rest of the study by first placing knowledge management system adoption in the context of digital transformation and the knowledge economy. The focus of this chapter was to provide an outline of what can be expected in the following chapters. Next, the research problem was defined, and objectives were stated, delineating the study's scope and setting the philosophical stance of the study. The literature was also reviewed, including the TOE framework, DOI model and CSFs that were used to construct a preliminary theoretical framework. These discussions, in

turn, guided the research design. Finally, the chapter concluded with ethical research considerations. The next chapter presents complex adaptive systems as the theoretical paradigm of the study.

2. CHAPTER 2: COMPLEX ADAPTIVE SYSTEMS AS A THEORETICAL PARADIGM FOR THE CONSTRUCTION OF KNOWLEDGE

The aim of this chapter is to describe the study's philosophical stance and theoretical framework, which will form the lens through which this study is viewed. It will address the study knowledge as well as the nature of reality, which will inform the further research design. The chapter emphasises a particular type of complex system called complex adaptive systems (CAS). A CAS possesses three important characteristics: complexity, adaptation, and co-evolution. These characteristics were described as they relate to KMS adoption and the purpose of the research.

2.1. Introduction

Fundamental beliefs about people's view of the world and their place in it constitute their paradigm (Guba & Lincoln, 1994). Therefore, this chapter first presents the philosophical stance of the study. Then, the adopted approach for this study, namely interpretivism, were contrasted with positivism to explain what constitutes acceptable knowledge (Saunders et al., 2015). From this, a rationale for the theoretical framework will act as a container for investigating and answering the research question. The purpose of this chapter was to lay the foundation for the research design and analysis to follow. The researcher is of the view that the nature of knowledge and reality is socially constructed and interpreted by social actors. Knowledge, therefore, can never be totally free of human interpretation and is thus subjective as opposed to completely objective.

2.2. Philosophical foundations (researchers' own ontological, epistemological, and methodological assumptions)

Epistemology is a branch of philosophy concerned with the nature of knowledge (e.g., what knowledge is, or how we come to know something as true) instead of simply believing something is true (Nagel, 2014). The epistemological continuum depicts positivism/empiricism on one end and interpretivism on the other. In addition, ontology

constitutes the nature of reality. In other words, what can be known about the world (Smith, 2003). The researcher will argue his epistemology and ontology in this chapter.

2.3. Perspectives on knowledge

Knowledge has traditionally been seen as something that is not only possible but also definable. For hundreds of years, the dominant analysis of knowledge as 'justified true belief' was challenged (Gettier, 1963). Justified true belief is a generally accepted definition in KM (Nonaka, 1994). The Gettier problem is a landmark philosophical problem that argues that a person can be justified in believing something is true without understanding or containing knowledge. Despite this problem, some counterarguments have been made in the No Defeater Analysis and the No False Belief analysis (Nagel, 2014). The latter argument contends for an additional criteria, which is that a subject has to believe a proposition based on true grounds (and not based on a belief which the subject believes to be true but is, in fact, false). For this study, knowledge were assumed to be possible and defined as justified true belief.

2.4. Truth as a continuum

Some ontological schools of thought argue that knowledge is objective (Nagel, 2014; Raineri, 2021). For example, naive realism claims that experienced perceptual reality exists as a perfect one-to-one representation of the outside world. The view that knowledge is derived only from sense-experience and observable social reality, verifiable as an accepted fact, is known as positivism. The ontology of positivism is external and objective, unrelated to the views of social actors (Guba & Lincoln, 1994; Saunders et al., 2015). Positivism is focused on law-like observations that allow for generalisations from facts and quantification (Paley, 2001; Saunders et al., 2015).

In contrast to positivism and wholly objective knowledge, the illusion argument has been offered as criticism of naive realism and mind-independent nature irrespective of an observer (Martin, 2010). Optical illusions give the viewer a sense-experience that is different from reality. The Muller-Lyer illusion (Gilbert, 2006) provides an appropriate example. Two lines of equal length are parallel, with the arrowheads pointing in opposite directions. Yet, even when the viewer is instructed to measure the lines and see that they are, in fact, of equal length, it does not change the viewer's perception.

Positivism is a paradigm that shows substantial overlap with empiricism. The contemporary landscape of epistemology has changed considerably since Aristotelian Empiricism (Brian, 2019; Burton, 2008; Nagel, 2014). The main assertion of empiricism is that of knowledge coming only from sense-experience. This idea was depicted in Aristotle's slogan, 'Nothing in the intellect not previously in the senses.' Empiricism, therefore, forms part of *a posteriori* knowledge (Martin, 2010). The idea of *a posteriori* knowledge is widely associated with Locke's (1841) 'Tabula Rasa ('blank slate'). Nothing exists in the mind before worldly sensations 'write' on the mind. The question that Locke aimed to answer was, in epistemological fashion, 'what do we as humans know?' Given the *posterori* inclination of Locke, the emphasis is on observing and experiencing phenomena (Nagel, 2014). Counter to knowledge as *a posteriori*, knowledge can also be deduced through reason, thereby inferring that the mind consists of innate ideas (*a priori* ideas). Knowing from reason as a philosophical view is known as rationalism (Nagel, 2014), with René Descartes being one of its leading proponents but nonetheless had similar ideas to Locke.

To further explore the nature of knowledge on a continuum with positivism as one extreme, a distinction must be drawn between the awareness of knowledge and knowledge itself. The famous "known unknowns" quote by US secretary of defence Donald Rumsfeld (2002) illustrates an important limit to human knowledge, with some knowledge in the mind being subconscious:

> *"As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know."*

Therefore, the ability to say, 'I know' and 'I know that I know' (metaknowledge) emanate from separate regions in the human brain (Burton, 2008). Thus, knowledge and awareness of knowledge (unknown knowns) originate from separate parts of the brain. For example, patients who suffer damage to some part of the brain's visual area are technically blind, as light impulses can be transferred from the retina to the brain but are unrecognisable to the visual parts of the brain where incoming light is processed. Yet,

patients with a condition known as blindsight can guess the left/right visual field of light above chance (Audi, 2020); that is, they do not know what they know.

In summary, in a fundamental sense, at one end of the continuum reality can be objective as observed, but it can be argued that it does not pre-exist as reality, as in *a posteriori* knowledge. For example, the direction of spin of an electron does not pre-exist as objective reality before measurement. Only after observation, and thus its measurement, can its spin objectively be measured (Lanza & Berman, 2016). In contrast, *a priori* knowledge asserts that some knowledge exist before birth (i.e. prior to any experience).

2.4.1. A priori knowledge

An argument for *a priori* knowledge is gender reassignment therapy (Diamond & Sigmundson, 1997). Arguably the most notorious case of this therapy was David Reimer, a Canadian boy who was brought up as a girl following a surgical accident. Suffering from identity issues ever since David later committed suicide. This case illustrates the a *priori* aspect of knowledge in the form of gender identity.

A priori knowledge can also be transferred from one organism to another intergenerationally. Thus, biological mechanisms can transfer information from one organism (e.g., a relative) to another. Studies in the field of epigenetics indicate that environmental factors can change the degree of an organism's expression of genetic material without changing the genetic sequence, thereby transferring certain traits to its offspring. At least three mechanisms are involved in this function, thereby transferring epigenetic changes from one generation to another (Jayasinghe, Udalamaththa, Imbulana & Suetake, 2015). Genetic blueprint does not 'reset' with every subsequent generation. Instead, environmental effects are transferred in an unbroken generational chain (Roberts, 2018). Therefore, knowledge transferred to the next person will produce *a priori* knowledge.

In addition, knowledge can also be a feeling simulated by the brain to give the thinker an indication of the 'rightness' of a thought (Campbell, 2020). Gut feelings, intuition, feeling of correctness, clarity, belief and the bizarre all fall under these epistemic feelings (collectively called the *feeling of knowing*). Sensations provide people with ways to

experience the external world (intense sensations of pain signals tell us to retreat; joy signals tell us to approach). Epistemic feelings provide humans with ways to experience the inner world of the mind (feelings of correctness and an '*aha*' moment). The sensations associated with a feeling of knowing are sometimes a false belief in certainty. Case studies abound on aberrant feelings of knowing. For example, a major study by Neisser and Harsch (1992) illustrated that false beliefs could be chosen over correct ones because of the *feeling* associated with correctness.

Similarly, the placebo effect provides a feeling of correctness where none should exist. In such a case, a patient is given medication without the knowledge that it is, in fact, a common sugar pill with no physiological effect on the body. Another variant is sham surgery, most notably by Moseley et al. (2002). The patient believes that they had just undergone a procedure for corrective knee surgery when, in fact, no procedure was performed, leaving the patient with only a small incision and bandages. Yet, even when the sham surgery is made known to some patients, they *still* experience improvement in their condition. Over fifteen years of research on the placebo effect in many different settings have yielded several areas in the brain and certain gene variations associated with this effect (Holmes, Tiwari & Kennedy, 2016). These feelings arise in the brain of the perceiver and, as such, cannot be said to be objective reality. Instead, the reality is constructed by the individual's brain, creating a subjective sense of rightness.

Another instance of misalignment between a person's actions and their knowledge of their actions is cognitive dissonance (Tavris & Aronson, 2020). When a 'feeling of correctness' is more associated with what a person would otherwise judge as 'wrong' behaviour for themselves than 'correct' behaviour, they would experience dissonance.

A similar effect that produces a feeling of familiarity or strangeness that a person has not experienced before is *déjà vu*, defined as a feeling of unfamiliarity for objects that should be otherwise familiar (Kostic, 2010). Burton's (2008) central premise is that involuntary brain processes (separate from reason) are the only way people can know something. These sensations produce feelings of correctness, knowing and conviction. The author concludes that "we know the nature and quality of our thoughts through feelings, not reason" (Burton, 2008: 138).

Today it is common knowledge among psychologists and neuroscientists that information from the environment must be interpreted before it can reside in neurological and biological mechanisms within the individual. In line with the critical realism paradigm (Maxwell, 2012), sensory experiences are never immune to perceptions, which are the active interpretation of sensory information, selective focus on some aspects of the information and the disregard of others (Weiten, 2014). Thus, the brain must process objective' truth', thereby leading to subjective experience.

If objective knowledge is problematic, the argument of what constitutes knowledge is difficult to attain. One alternative is to consider the Relevant Alternatives' theory of knowledge from the contextualists who contend that knowledge is context-specific. 'Mount Everest is the tallest mountain in the world' is a true statement when allowing a 'low' standard of knowledge. Second-hand knowledge (testimony) from friends, mountaineers or encyclopaedias still constitutes knowledge. However, when employing the 'high' standards of the Sceptics who contend that knowledge is impossible, no amount of testimony or observation will suffice (Dutant, 2015; Kelp, 2018; Nagel, 2014). A classic example of contextualism in practice originates from the area of Newtonian physics (classical mechanics), which allows the calculation and prediction of how motion changes because of a particular force acting on an object. Using Newton's universal law of gravitation, a precise prediction can be made regarding the motion of any object under the influence of gravity on Earth (BBC, 2008). Perhaps the most remarkable aspect of Newton's law is that it is *universal* — what is true for motion under the influence of gravity on earth is also true for all objects in the entire universe. Proof of the Newtonian laws' predictive power was successfully applied after the prophetic words of American President John F. Kennedy of "landing a man on the moon and returning him safely to the earth" (Columbia Broadcasting Systems, 1961). Eight years later, Apollo 11 landed on the moon and returned to earth as predicted by Newton's universal law of gravitation. Newtonian laws can thus be objective, independent of the interpretation of observers and behaving as predicted. These laws align with positivism, which suggests that objective laws are generalisable. However, subsequent, more exact experiments utilising the duration laser light takes to be reflected off the lunar surface showed that Newtonian physics is the best approximation of reality. The more precise experiments found

Einstein's General and Special Relativity law to be superior in predicting the lunar orbit (Merkowitz, 2010), calling into question the 'absolute' knowledge that allows for generalisations *in the context of* more rigorous standards of knowledge (BBC, 2008).

In summary, three main premises endorse the subjectivity of knowledge and reality. Firstly, the conviction of true reality is not based on logical reasoning but rather based on a feeling of rightness of a 'fact' as illustrated by phenomena such as *déjà vu* and cognitive dissonance (Burton, 2008). Secondly, a priori knowledge, which already partly resides in the individual before or prior to any lived experiences and as a result of an intergenerational transfer, indicates a subjective experience (Roberts, 2018). Thirdly, it is, therefore, the opinion of the researcher that what constitutes knowledge at a given time or during a particular investigation is context-specific, thus also indicating the influence of the environment on a person's epistemology.

2.5. Interpretivism as subjective truth

The following paragraphs argue for a philosophy grounded in interpretivism. The central tenet of interpretivism is understanding (Williamson, 2018). Since Max Weber instilled this perspective (Tucker, 1965), social scientists have emphasised the inextricability of understanding from interpretation. Interpretivism distinguishes humans and physical phenomena. Interpretivism considers differences such as social realities (Alharahsheh & Pius, 2020). Actors' interpretations of their roles differ due to inherently subjective reality. In this study, the study aims to understand SME employees' lived experiences and interpret their social world at work. Interpretivism sees humans as social actors (Bryman, 2016) and asserts that there are no absolute truths, only interpretations (Jacobs, 2010). Humans create and interpret reality as they interact with the world, partly based on their past experiences (Barrett, 2017). This study interprets reality as slanting more toward intersubjectivity and subjectivity than true objectivism.

Max Weber opposed the positivist view and considered it an alternative to the interpretivist worldview, which is only concerned with dissimilarities "between humans in our role as social actors" (Saunders et al., 2015: 147). Based on the arguments above for truth as subjective and based on the interpretation of stimuli, the study, therefore, includes

the interpretivist ontological paradigm accorded to humans as actors in social roles (Bryman, 2016).

As argued, reality can thus be both subjective and intersubjective (Stordy, 2012). Intersubjective realities are realities that exist simultaneously in the minds of many individuals (Harari, 2014). Organisations are intersubjective, as they are 'real' in that many individuals agree to their existence, yet the existence is only real insofar as many individuals hold the same intangible belief. Most cognitive processing happens in the subconscious (Mlodinow, 2012). Brain cells that constitute these subliminal processes take input from sensory neurons to produce an output. Any particular neuron has many thousands of connections to the input neuron. What we commonly refer to as 'learning' are the weights of the input neurons shifting to attribute the appropriate significance to the input. The 'space' in the brain where weighing the importance of an input happens is known as the hidden layer. The 'space' is not a physical structure within the brain. Instead, it is the connections between neurons that produce the hidden layer. All the inputs are calculated in the hidden layer to produce an output.

Accordingly, since the input originates from personal attributes (e.g., sensations, past experiences, and memories), experiences cannot be quantified and therefore remain subjective qualia (Burton, 2008).

Actors' interpretations of their roles differ due to an inherently subjective reality. Humans create and interpret reality as they interact with the world, primarily based on past experiences (Barrett, 2017). Reality is inferred from the environment, not only what happens in the mind. As Lotto (2017: Loc. 185) states:

> *"To question one's assumptions, especially those that define ourselves, requires knowing that you don't see the reality—only your mind's version of reality—and admitting this, not to mention accepting the possibility that someone else might know better… there is an objective "truth" or reality, but our brains don't give us access to it." This argument is supported by scientific findings that only ten percent of the information that the brain uses to see emanates from the eyes. The remaining part*

originates from other brain areas, including associations from past experiences embedded in short and long-term memories" (Lotto, 2017).

Consequently, perception of reality originates predominantly from neural activity in the brain, not from reality 'out there'. Objectively, a rock's existence in space is real, but the individual constructed the concept of a planet being of a minimum size and possessing other specific features.

People interpret the roles they play as actors giving them a unique meaning. Differences in behavioural responses and the influence of context cause people to respond in different ways. As a result, humans create the world around them.

Many of the concepts humans hold are culture-specific and are thus passed on only from one generation to the next within that particular culture. For example, specific emotional experiences are reserved only for certain cultures because the concepts upon which those emotions rest are familiar, whereas, in other cultures, these emotional experiences are absent. The emotional concept in Dutch culture of '*gezellig*', meaning the comfort, cosiness and togetherness of being at home with family and friends, has no direct English translation (Barrett, 2017).

The methodology based on the interpretivist worldview (see Chapter 4) aims to study and understand phenomena using the interpretations individuals attach to them. From this, it can be inferred that any methodology used to study a phenomenon will involve some degree of measurement error (Hawaii University, 2020), whether through the instrument or through the interviewer who "give them as they see them" and not "gives them as they are" (Maxwell, 2012). It is the opinion of the study that true objectivity is impossible to achieve, if not mostly impossible. Valid and reliable measuring instruments, although able to provide the observer with a result, is ultimately only a close approximation of the true value. Interpretivism emphasises a subjective, socially constructed reality. It further values the multiple perspectives of individuals or groups. Therefore, a qualitative research methodology that answers the research question is warranted.

In this section, it has been argued that knowledge is subjective due to *a priori* knowledge and the manner of interpreting sensory information in the brain. Interpretivism embraces a philosophical stance (epistemology and ontology) that emphasises how humans make meaning of their world (Schwartz-Shea & Yanow, 2020). Individuals have consciousness and do not simply react to social forces reflexively, as positivists believe. The purpose of interpretivism is to gain an empathic understanding of why people behave the way they do (Saunders, Lewis & Thornhill, 2020).

The following section presents metaphors as a descriptor of reality. The purpose of metaphors is to connect the psychological to the physical and the abstract to the concrete. Metaphors are vehicles which enable humans to communicate abstract ideas more clearly. As such, metaphors are often bound up in a socio-historical context. The metaphors humans use to communicate their ideas are based on the ideas of that time and hence influence human thoughts in fundamental ways. Thus, the metaphors humans utilised during the Industrial revolution and henceforth have biased humans for particular thoughts, directly shaping their behaviour.

As elucidated in more detail below, the dominant metaphor during the Industrial Revolution differs significantly from today's dominant metaphor(s). Nevertheless, it has an extensive impact on the development of models of the world, in particular, the boundary conditions of technology adoption models: to what extent one variable can influence another, the extent to which the influence can be predicted and the extent to which its effects are significant.

2.6. Man embedded in metaphors – The origins of metaphors

Complex systems are abundant in nature. Ant colonies, national economies, and social structures are but a few examples. In addition, the human brain is perhaps the most complex system in the known universe (Gentili, 2018) and can even conceptualise abstract things that are socially constructed, as we saw in the previous chapter. The brain, as a complex system, has to accomplish an impossible number of tasks daily, such as remembering, anticipating the future (Lee, Aly & Baldassano, 2021) and, subsequently,

deciding the best alternative among possible options while being constrained by ‘bounded rationality’ (Simon, 1972). Memories on which decision-making is based cannot exist, and better decisions cannot be distinguished from poor ones if not for the concept of learning. The mechanism by which learning occurs is through associations between neurons. Hebb (1949) detailed the process, known as Hebbian learning, as follows:

> *“The general idea is an old one, that any two cells or systems of cells that are repeatedly active at the same time will tend to become 'associated' so that activity in one facilitates activity in the other.”* (Hebb, 1949: 70).

As a result of this process, everyday experiences become associated neurologically with time and space. For instance, the warmth of being held against a caregiver connects the two experiences of physical bodily warmth and affection. Lakoff and Johnson (1980) opined that it is these experiences that give rise to metaphorical thought, such as a *warm* person or a person being “a block of ice” (Lakoff & Johnson, 1980: 256). Modern language is repleted with metaphors that occur as a result of associative learning. The Industrial Revolution was inaugurated with the invention of the steam engine. As water is heated to high temperatures, pressure builds up in the ‘kettle’, which is released as kinetic energy to do work. This pervasive industrial process gave rise to mechanisms for helping to explain the inner workings of the human body that was at that time more abstract and harder to investigate. Concepts such as ‘boiling mad’ with ‘pressure that needs to be released’ or a person so angry they want to ‘explode’ and need to ‘cool down’ (Geary, 2011) originated in the industrial revolution. The industrial revolution led the way with mechanical metaphors introduced by the society of that time to turn abstract concepts into tangible concepts.

Metaphors are inextricably linked to our thoughts and thus form part of our identity. It is a mechanism by which the psychological and the physical become intertwined. Metaphors allow for more than comparison between similar objects and depict an object *as if* it truly embodies what the object is (Geary, 2011). The brain uses metaphors as models of reality (Meadows, 2008; Mitchell, 2009). Barring any model’s limitations, models provide a particular lens from which to perceive the world. With the advent of personal computers and the digital age, the predominant metaphor society has adapted to fit the socio-historical context in the brain of a computer, which inputs, processes and outputs data.

2.7. Metaphor 1: Man as a machine

The metaphor that predominated the Scientific Revolutions was the ‘organisation as a machine’ represented by Isaac Newton’s ‘clockwork universe’ (Bongard & Levin, 2021; Mitchell, 2009), Descartes’ analytical thinking and Laplacian predictions (Capra, 1996). Predictions are assumed to be perfectly possible, given sufficient parameters.

Prevailing in the 16th and 17th centuries was the Newtonian-Cartesian metaphor of the ‘world as a machine’ (Kauffman, 2019). The abundance of steel industries that became synonymous with the Industrial Revolution further enforced the machine metaphor. It was viewed as everything having a definite cause and effect and being deterministic (Waldrop, 2019). Future states of objects could be determined with Laplacian precision. Following the exact predictions brought about by the Newtonian-Cartesian paradigm and given the current positions and velocities of every single particle in the universe, it seems possible to predict “everything for all time” (Mitchell, 2009: 19). Also, due to the position and velocity of objects, such as machines and planets’ orbits that could be precisely measured, it was believed that the universe and everything in it could be predicted.

From that era onwards, three fundamental Newtonian Laws dominated the world: i) The world was seen as a machine set in motion by a blind watchmaker to give rise to clockwork predictability (Wheatley, 2006). ii) People’s behaviours were predictable, and they did not mind being perceived as a ‘cog in the machine’. iii) Computers are viewed as predictable instances of computation that can calculate precisely without failure. But, as the study will indicate, the behaviour of knowledge management system adoption and the human behavioural factors accompanying it is often highly unpredictable and chaotic. A mechanistic metaphor is one metaphor which has, in recent decades, brought a new metaphor into focus.

In contrast, reductionist thinking, where the whole is taken apart and each part studied in isolation, gave way to holistic thinking (Meadows, 2008; Pourdehnad, Wexler & Wilson, 2011) in the 1920s with the advent of quantum mechanics. Scientists recognised that systems can only be understood as integrated networks and that the sum is more than its parts. A system can thus be defined as an interconnected set of elements that define

the elements' specific relationship with a particular purpose (Capra, 1996; de Canete, Galindo, Barbancho & Luque, 2018; Meadows, 2008). For example, a computer system contains a hard drive, memory, processors and speakers. System properties that exist as part of the system as a whole but are not present at the parts level are known as emergence (Turner & Baker, 2019). Emergence is a distinguishing characteristic between complicated systems and complex systems (Holland, 2014). Emergence allows a computer to do more than any individual parts can do independently, as they are integrated into a functioning whole. Therefore, holistic thinking in the early 20th century gave rise to system thinking presented in the seminal work of Von Bertalanffy's (1968) General System Theory (Hammond, 2019).

A particular type of system, a complex system, is an extension of system thinking (Stacey, 2000). For this study, the study will focus on a particular complex system: a Complex Adaptive System (CAS) in the context of SMEs. A CAS is a type of system under Complexity Theory (CT) applied to natural systems (Schneider & Somers, 2006; Turner & Baker, 2019) and is characterised by agents acting in unison, decentralised control of the system, multilevel organisation, self-organisation and prediction-making about the future (Waldrop, 2019). As the name suggests, it is a system that can adapt to and evolve with a changing environment. In other words, the system changes its elements in response to changes in itself and the environment. A CAS "is the key to understanding how knowledge naturally unfolds in human organisations" (McElroy, 2001: 201). By including the principles of a CAS in practice, practitioners of KM have much to gain.

Through a complexity lens, this study frames the adoption of KMSs as an issue that needs to be approached holistically at various levels, considering influencing factors on an individual, technological, organisational and environmental level. The adoption of a system is an emergent property that results from the interaction of many factors to yield adoption.

2.8. Metaphor 2: A microscopic view of the organisation

A fitting metaphor for use for a framework that encompasses different levels of analysis (e.g., individual, organisational, technological and environmental contexts) is a microscope. A microscope allows a user to investigate an object's substructures at different magnification levels.

The microscope displays a different structure embedded within more structures at each level. Forces between different natural subsystems utilise different natural laws (Chaichian, Perez & Tureanu, 2021). Laws governing large objects are impacted by gravitational force. At the level of atoms, the strong force holds atomic nuclei together, while at larger magnification levels, electromagnetic forces assist in keeping insects stuck to walls. Focusing on a structure at different levels of detail may reveal emergent phenomena that are not visible at larger magnification levels. The same line of metaphoric thought can be applied to organisations. Every organisation consists of agents (employees) at a micro level while it forms a constituent of a more extensive system (for instance, the national economy) at a global level.

2.9. Linear thinking as a defence against complexity

The ‘machine’ metaphor gave rise to a model emphasising reductionism, determinism, causality and linear thought (Ackoff, 1972; Capra, 1996; Waldrop, 2019). Newtonian equations enable the calculation of earth-bound and interplanetary objects with the greatest precision using only the characteristics of objects that are gravitationally attracted. The attraction between two forces assumes no significant additional forces acting on any of the two forces. Thus, a linear cause-effect relationship exists between the two forces. As argued in Chapter 1, determinism is an illusion falsified by Einstein’s relativistic equations. The mechanistic worldview further implies that the whole can be taken apart and dissected into its constituent parts while still understood in its entirety. Each component has only a linear (direct) influence, such as the spark of a piston or the friction of brakes applied to a flat surface. A change in the environment leads to a linear change by the object within a perfect Laplacian prediction (Mcbride, 2005;

Waldrop, 2019). Linear thinking provides order amidst the complexity and unpredictability of life. This thinking seems to have adaptive qualities and is therefore built into human cognition. Duke (2018) highlights this point:

> *"Our brains evolved to create certainty and order. We are uncomfortable with the idea that luck plays a significant role in our lives. We recognize the existence of luck, but we resist the idea that, despite our best efforts, things might not work out the way we want. It feels better for us to imagine the world as an orderly place, where randomness does not wreak havoc and things are perfectly predictable. We evolved to see the world that way. Creating order out of chaos has been necessary for our survival"* (Duke, 2018: 11)."

This line of reasoning signifies that humans are innately wired to perceive an orderly, predictable world with single causes. However, the failure rate of information systems, including knowledge management systems, indicate that the cause of failure is multifactorial and no simple, single cause exists. It happens despite technological advances, improved understanding of human-computer interaction and research on KMS failures. Therefore, as will be suggested in Chapter 3, to improve KMS adoption rates, a holistic approach considering a variety of contexts affecting adoption needs to be considered. For instance, the external environment, the technological context, the individual user and the organisation may contribute to KMS adoption. Nevertheless, there are compelling reasons for people to gravitate towards singular causes and effects.

During the Scientific Revolution, Descartes devised analytical thinking, a method for studying parts separate from their whole (Capra, 1996). This paradigm, where complex phenomena can be understood by breaking them into smaller, simpler parts, is known as reductionism (Anderson, 1972; Mitchell, 2009; Pourdehnad, 2011; Waldrop, 2019). For a linear system to be understood, the parts must be individually examined and put back together. However, reductionism ignores the simultaneous effect of other components on each other (Mitchell, 2009).

A reduction of wholes into parts cannot always indicate the sum. Anderson (1972) outlines nonlinear scaling from small to larger objects. If it is understood that a system consists of atoms, it is impossible to infer the structure of the whole system by understanding the atoms in the finest detail. Oxygen, for example, is a prolific oxidiser and can accelerate an already-burning fire. In addition, hydrogen, most notorious as the cause of the Hindenburg disaster, is highly flammable. Ironically, when oxygen and hydrogen are chemically combined in the correct ratio, a new product, water, forms, counterintuitively inflammable. New properties emerge at higher levels of complexity that are not present at lower magnification levels.

A discussion of the ebb and flow of mechanisms (reductionism) to understand the whole (holism) rather than its parts (reductionism) as a dominant worldview has been prominent in biology throughout centuries (Capra, 1995). A holistic worldview considers the different elements, not only in isolation but also in their organisation pattern and dependence on one another. For example, treating a patient with copious amounts of antibiotic medication a physician would be unwise, considering unintended consequences to other critical subsystems within the body. Linear thinking, which isolates and simplifies the influence of cause and effect, is needed to account for the complexity which arises in the real world to gain a more realistic understanding of reality. To model the adoption of complex technological systems requires a new way of thinking.

2.10. Non-linear thinking: complexity in a systems

A system is an interconnected set of elements that is coherently organised to achieve a particular purpose (Capra, 1996; de Canete, Galindo, Barbancho & Luque, 2018; Meadows, 2008). From here, three characteristics of systems can be identified: elements, interconnections, and purpose (The Institute for Systems Sciences, Innovation and Sustainability Research, 2022). Elements constitute all the parts of a system while working as a coherent whole to achieve a specific objective. Some objects contain interconnected elements that together form the sum of the parts and are said to be complicated systems. Due to the interconnected nature in which every part is connected

to more than one additional part, complex adaptive systems and living systems constitute complex systems (Boi, 2019; Gharajedaghi, 2011; Kim & Kaplan, 2006).

Principles of system behaviour were established in the 1950s by von Bertalanffy (1968) to formalise the study of general system characteristics and provide a framework for dealing with problems in systems.

Systems thinking allowed the break from reductionism and analysis through a more in-depth comprehension of fundamental structure. According to Schuster (2018), systems thinking

> *"…is, at its heart, looking at problems in a way we haven't before. It is a realization that everything is interconnected, and we should look at things as a whole rather than just a group of independent parts. Systems thinking means looking at the big picture first, then digging in deeper to examine its parts and focusing on the relationships between them. It is a supportive framework that helps you develop habits in your mind".* (Location 124).

2.11. Flow: open and closed systems

Given the nature of complex systems, a feature that distinguishes the two systems needs to be addressed, namely, open and closed systems.

According to the second law of thermodynamics, the total quantity of disorder within an isolated system always increases. The increase in disorder will occur to the point of equilibrium until the system is devoid of distinction (Gentili, 2018; Gharajedaghi, 2011; Mitchell, 2009). Disorder (lack of usable information in a system) is measured through entropy. Higher entropy indicates a greater inability to change, whereas low entropy indicates an ordered state. The natural progression of closed systems is towards higher entropy. Therefore, the disorder will inevitably increase in closed systems towards a point where the disorder is at a maximum. Pinker (2018) highlights that information may be considered a reduction in entropy (Mitchell, 2009).

This movement towards disorder is seemingly in contravention of the apparent orderliness in the universe (e.g., crystals, galaxies and living systems). Thus, a paradox exists regarding the order created in living systems, given the natural tendency for disorder to increase in closed systems.

Open systems tend to resist disorder (negentropy). In addition, under certain conditions, however, entropy can be halted. As discussed below, the organisation as a complex adaptive system is open and closed regarding its structure and organisation (Capra, 1996).

A fundamental change in our understanding of the nature of space and time overthrew the machine metaphor to be replaced by organisations as living systems, which are types of complex adaptive systems (Laloux, 2014; Preiser, Biggs, De Vos & Folke, 2018). Organisations in the mechanistic era are confined to departments, teams and buildings. Living systems, conversely, function on networks and interdependent relationships (Wheatley, 2006). To survive and thrive, the organisation connects its current knowledge in a self-referential pattern to more of itself; in other words, more knowledge. The denser the networks and relationships between individuals and teams, the more knowledge can be connected with the current state of affairs, and the stronger the knowledge innate to the organisation becomes. Organisations create webs of relationships (Wheatley, 1999). When a web in the relationship breaks, the relationship is retrieved from connections already established, creating stronger connections than before.

Organisational processes based on Newtonian mechanisms have broken the connections of relationships between people and systems. Organisations need to enable self-organisation so that new connections can continuously be re-established. If adoption fails, processes should be in place to make adoption energetically favourable for spontaneous order.

2.12. Openness

At any particular time, an organisation can primarily take on two states (Serrat, 2021). Closed systems are closed off from their environment and can, therefore, not exchange matter, energy or information with their environment. What constitutes an ‘environment’ is essentially the parts of a larger system, not part of the system under investigation. The environment in which an organisation finds itself consists of various forces that exert tension on the system yet also provide key resources potentially available to the system (Gharajedaghi, 2011). In contrast, open systems constantly exchange resources with their environment. The energy passes through a boundary to the environment and from the environment to the system (Gharajedaghi, 2011). As a result, the system can receive feedback about its behaviour from the environment. An SME is in constant flux as it interacts with the environment (competitors, governmental regulation). When the focus is placed on the KMS, the environment becomes the influence within the SME, directly or indirectly, that may influence adoption. These influences constantly perpetuate the flow of information and energy between the KMS and its users. Without constant open feedback between users and the KMS, adjusting the system’s needs to its environment, the close coupling becomes decoupled, and the system dies (Powell, 2019).

An organisation needs to allow the flux of information and matter to and from its environment. Without input from the environment, there is no feedback on the organisation's anticipated nature and rate of change. New information systems on the market can foster greater competitiveness or create more competition if the organisation does not adopt the new information system timeously.

2.13. Self-organisation

Systems could spontaneously order themselves into a more stable manner without the need to be externally directed or controlled (Anish & Gupta, 2014; Prigogine, 1976; Waldrop, 2019). Self-organisation also entails holistic patterns created as a result of human interactions. These features include causation and feedback (see 2.14). In a KM context, a self-organised system is created when employees respond to management's

requests and suggestions regarding the KMS without the influence of colleagues or in the absence of managerial rules. Proper training allows for the proper storage (and hence retrieval) of information from the KMS.

Management can adjust the fitness landscape in the local environment to improve self-organisation and, thus, better KMS adoption. Principles for adjusting the fitness landscape include offering incentives and long-term rewards by adjusting priorities. Applying straightforward design principles means that employees can convert them into rules (Ellis & Herbert, 2010). Automating manual processes is another instance of enabling self-organisation between the KMS and its environment.

2.14. Feedback loops

Feedback loops occur when the output of some process within a system becomes the input to a new system (Arnold & Wade, 2015). These system mechanism characteristics lead to growth, amplify deviations or counteract system change (Arnold & Wade, 2015). Positive feedback loops lead to runaway cycles as the simultaneous input and output perpetuate a reinforcement cycle. Conversely, remedial action exists in the form of negative feedback loops, which counterbalance the runaway feedback to bring the system closer to the goal (e.g., homeostasis) (Billman, 2020).

A positive feedback loop can originate in KMS when individual behaviour facilitates adoption, which in turn further reinforces beliefs of competence from other employees, creating a reinforcing cycle of change. On the other hand, negative feedback loops inhibit change and keep a system stuck in old strategies or behaviour, preventing the adoption of the new KMS or change within its structure (Henning, 2009). The researcher opines that a balance between positive and negative feedback is required to maintain sufficient levels of adoption.

The SME owner has the ability to halt resistance from a group of employees who are against the new KMS and who aim to influence co-workers to similarly not adopt the

system. Conversely, acceptance and encouragement of KMS adoption by top management might feed back to resistant employees to also start using the KMS.

2.15. Emergence

When a system (or its parts) self-organise in a particular way, the whole becomes more than the sum of the parts. Properties that exist in the system as a whole cannot be deduced from single elements in the system. Innovative adoption pathways can emerge due to the higher levels of phenomena that result from emergence. As a result of the interaction among system elements (e.g., employees, support structures, and management), the system cannot be understood reductionistically (Gharajedaghi, 2011).

The multi-factorial and complex nature of KMS adoption produces adoption only at an emergent level that cannot be understood through the analysis of isolated environments. Instead, adoption needs to be approached holistically to identify the most salient combination of factors leading to adoption. Feedback should be monitored and appreciated to encourage signals for adoption or resistance of the KMS.

2.16. Homeostasis: “Far from Equilibrium”

Paradoxically, for a system to be in a state of homeostasis, it should deal with order and disorder close to ‘the edge of chaos’. A state of bounded instability engenders dynamic interaction between order and disorder (Stacey, 1992; Turner & Baker, 2019). Systems in this state are not entirely ordered, yet not completely chaotic. When boundaries are completely closed off, their environmental systems lose their ability to function at the edge of chaos and disintegrate. Either an excess of stability or flexibility will result in system failure (Dosi & Roventini, 2019; Turner & Baker, 2019).

A KMS functioning in boundaries closed to feedback will lead to resistance. Instead, enterprises could allow sufficient control through management policies with sufficient flexibility through creativity while still limiting system adoption constraints.

2.17. Synergy

In a CAS, the whole is greater than the sum of the parts (Gharajedaghi, 2011); each element depends on the other elements in that system. Consequently, the focus should be on the system instead of reductionism, which emphasises the individual elements and does not account for the interactions between the parts (Preiser, 2018).

Adopting the KMS depends on more than one level of complexity and thus requires healthy interdependence between the levels. Linked to creativity, informal, interdependent networks of elements (employees, information systems) collaborate to contribute to successful KMS adoption. Synergy in various environments that influence KMS adoption can be strengthened, for instance, by augmenting the strength of the connection between elements and respecting management principles, thereby cooperatively directing the right course of action.

2.18. Critique of systems theory

Recent debates have centred on the lack of consensus on terminology and the diverse number of perspectives, thereby discouraging practitioners and researchers from communicating between their domains of expertise (Rousseau, Billingham & Calvo-Amodio, 2018). Criticism of systems theory has mainly revolved around its theoretical nature and the fact that the concepts have not been sufficiently put into action (Lowman, 2002). Additional critique for system theory centres, among other debates, around two premises. According to Stacey (2003), rationalist teleology and formative teleology indicate contradictions. People cannot be free from the influence of a system and simultaneously be influenced by it. Systems thinking can also not explain the emergent change in systems. Human interaction is “trivialised” (Luoma, 2007: 1), and the role of human freedom is not considered (Luoma, 2007; Stacey, 2003).

2.19. The uncertainty principle of Heisenberg: a quantum leap for mankind

Science in the early 20th century overthrew the conventional wisdom of Newtonian determinism. The certainty that accompanies cause and effect no longer prevailed. Einstein's Special and General Theory of Relativity changed human understanding of the relationship between space and time (Greene, 2004). Relative motion between two observers results in the differential perception of the timing of two events. Time dilates, and space contracts for two observers in relative motion; thus, perception changes with perspective. The Einsteinian-quantum age was set firmly in motion in the 1920s with discoveries such as the Heisenberg Uncertainty Principle. This principle asserts that any fundamental particle's position and momentum cannot be simultaneously determined. Increased certainty in one results in decreased certainty in the other. The uncertainty principle further implies that space can never be completely empty. New particles always spring into existence and vanish within a fleeting moment (Cox & Foreshaw, 2012). With these discoveries, Laplacian determinism was completely overturned and hailed in a new era of indeterminism and probability.

Quantum theory, therefore, wholly replaces Newtonian physics. Even though Newtonian physics is accurate enough to be utilised in the macro world, it is fundamentally flawed (Zohar, 2022). As Cox & Forshaw (2012) remark, it is not an either-or dichotomy for Newton and quantum physics; quantum physics encompasses all matter— the large and the small.

2.20. Chaotic, complex adaptive systems

For the argument to follow, a distinction must be drawn between two main types of systems: chaotic and complex.

As illustrated in the preceding sections, linear systems, in which the decomposition of the sum yields the parts, can be reconstructed to yield the total solution. However, there is inherent uncertainty in chaotic and complex systems due to nonlinear dynamics. Instead

of evolving linearly, these systems evolve according to power laws. An increase in X results in a disproportionate change in Y. Uncertainty holds two significant implications for complex and chaotic system behaviour (Rickles, Hawe & Shiell, 2007). First, predictions following nonlinear paths might become unpredictable, and second, minute rounding errors in initial conditions might cause significant errors in long-term predictions (Waldrop, 2019).

Key to chaotic systems is the sensitive dependence on initial conditions. The slightest change in a process could yield unpredictable, chaotic behaviour in the future (Mitchell, 2009). In chaotic systems, given the initial conditions of such systems, the evolution and destination of the system can be mathematically determined. In this sense, a chaotic system is deterministic. However, the same event cannot be replicated. Due to the quantum effects mentioned earlier (such as the Heisenberg uncertainty principle), an object's position can only be defined within a finite probability. The slightest changes to the initial conditions will reveal a different destination. Thus, two events with the same initial conditions will, after some time, produce different results (Shivamoggi, 2014).

Applying complexity to management, Baets (2006) asserted that managerial prediction is impossible because of the unpredictability of events. Within a technology context, the will to control and direct the adoption of technology results in a chaotic process. "The presence of chaos in a system implies that perfect prediction à la Laplace is impossible not only in practice but also in principle…" (Mitchell, 2009: 33); Marchal, 2019).

In an organisational context, the study refers to the initial conditions as the state of various contexts before a decision (adoption of a KMS), such as IT experience and self-efficacy in dealing with KMSs. Small perturbations unaccounted for in initial conditions (e.g., age of employees or information system (IS) experience) can lead to unpredicted changes.

A core theme of complex systems includes focusing on the relationships between parts rather than the parts themselves. Emergent properties arise from the interaction of system elements that are not present in any parts. Emergence separates complicated and complex systems from each other (Holland, 1995). Due to the interaction of the elements,

interdependent elements in the system adapt spontaneously to create novel, more complex self-organising structures.

Balancing and reinforcing feedback loops is a mechanism seeking to amplify the unpredictability and uncertainty from initial conditions in complex systems. Positive feedback loops can cause a system to deviate further from a predetermined course of action, and negative feedback loops can halt unintended change (Carmichael & Hadzikadic, 2019). Unintended initial conditions can result in chaotic behaviour in future due to reinforcing feedback (e.g., social influence).

To illustrate the evolution of systems overtime as a result of feedback, among other things, logistic maps are used to indicate diverging trajectories of two systems with almost identical initial conditions. One system can oscillate between one or more different values, whereas the other system's patterns never repeat. Such a point where the system oscillates as a point of relative stability is known as an attractor (Mcbride, 2005). Attractors that create stable but counterproductive behaviour within the system can harm the use of the KMS. An example of attractors in an organisation includes the adoption or resistance of a KMS (McBride, 2005). Stability can be introduced into the complex system through IT services (e.g., IT support, IT hardware), which are seen as attractors in information systems. Organisations are systems that evolve over time with ever-changing features. Next, organisations will be examined as complex adaptive systems.

2.21. Organisations as complex adaptive systems

The characteristics of a complex adaptive system (CAS) will be briefly discussed (e.g., Sammut-Bonnici, 2015).

2.22. Complexity

Although the definition of what constitutes complexity is not agreed upon among scholars (Anish & Gupta, 2014; Mitchell, 2009), CAS complexity involves unpredictability and emergence (Ellis, Churruca & Braithwaite, 2017; Sammut-Bonnici, 2015). CAS consists

of agents interacting in an environment where each agent is connected to one or more agents. Faced with pressure from the environment leads to constant adaptation by the agents. The interactive nature of agents within systems requires that single influences be set aside. Even as individual parts are studied, system dynamics still need to be considered. The relational nature of the universe implies that elements are always dependent on each other in a system, involving subsystems and suprasystems at many levels (Ellis, Churruca & Braithwaite, 2017).

The constant back-and-forth exchange of information among agents gives rise to emergent properties within a system. No single agent has complete control over the whole system, meaning that control among agents is decentralised (Jansen, Cammock & Conner, 2011) so that the system self-organises when adapting to environmental changes. For instance, this emergent property is called consciousness among nerve cells in the brain. Additional examples of CASs are part of the management of ecologies, economies, and technologies (Anish & Gupta, 2014; Dooley, 1997; Preiser, Biggs, De Vos, Folke, 2018).

Relationships are context-dependent, as in the quantum and atomic world of quarks and molecules. Elements in different combinations produce vastly different reactions. Models predicting the adoption of a specific IS, such as a knowledge management system, will necessarily result in disparate adoption levels. In addition, competitive forces outside the organisation can interact to affect the organisation as a system. Regarding the interconnected nature of networks, McBride (2005) notes that when interpreting an IS's social effects, the organisational and social networks within it should also be considered.

2.23. Adaptability

The adaptability of a CAS originates from the fact that it proactively acts to changes in its environment. Consequently, it learns and develops from the responses and changes (Anish & Gupta, 2014; Waldrop, 2019; Wheatley, 2006).

Employing a multi-agent search technique, agents in a CAS progressively refine routes towards their goal. Agents can adapt to their environment through a two-pronged approach of exploration and exploitation. The process starts with initial random exploration by agents over a large terrain. Then, through feedback, information from the environment is continually updated to identify possible courses of action, the direction of movement and the depth of exploration. Exploration is only efficient to a particular threshold before marginal resource consumption exceeds the benefit. Exploration must be accompanied by exploitation whereby high-probability territories are disproportionately allocated high resources. Random scanning is thus weighed against determinism (Rehling & Hofstadter, 1997; Skyrius, 2021). A fitting example includes ant colonies that are foraging for food. Initial foraging takes on random behaviour in many directions resulting in unsuccessful foraging. Progressively, as food is being discovered, exploration increases. The food source acts as a signal and is thus exploited by attracting additional ants, increasing the likelihood of finding more food in that area. Exploration and exploitation occur in parallel since agents explore high-probability options in more depth and continue investigating unexplored terrain (Mitchell, 2009).

In an organisational context, employees act as agents that adapt to changes in the internal and external environment. For example, a newly implemented KMS creates change within the organisation that requires adaptation. Agents tasked with acquiring and implementing the system explore a vast number of alternative options. In parallel, information systems most aligned with organisational objectives are more likely to be adopted, whilst alternative options are also explored.

Organisations co-exist in a dynamic environment with different systems (e.g., competitors, technological, economic, political) acting to influence KMS adoption success. The reciprocal influence between the organisation and the external environment (context) implies that the organisation needs to adapt to environmental changes. In particular, the environment consists of the behavioural context (the users of the KMS), the internal context (the organisation), the technological context (i.e., the adoption of the requisite IS) and the environmental context (i.e., influences from factors outside the organisation). As alluded to earlier, the most fitting models are, at best, an approximation

of reality. Lotto (2017) cautions that "… there is an objective "truth" or reality, but our brains don't give us access to it." (Location 185)".

2.24. Co-evolution

The process of continuous change, developing over time, whereby agents continuously adapt as they interact with each other is known as co-evolution (Rickles, Hawe & Shiell, 2007; Turner & Baker, 2019; Wheatley, 2006). At a local scale, the interaction exists between systems within other systems. A reciprocal action exists between agents and their environment at a global scale.

In an organisational context, apart from the requirement of a critical mass for user adoption of a (technological) system, the technology co-evolves together with economic, political and cultural contexts, which affect the use of technology and is, in turn, affected by others (Allenby & Sarewitz, 2011).

The human brain is an excellent example of a complex adaptive system. Arguably one of the most complex systems in the universe, it is confined to the boundary of the human skull. The interconnectedness of objects in the universe at various scales (e.g., electrons, atoms, stars, galaxies and social interaction) give rise to vastly more interactions than can be accurately comprehended. Thus, reality as a one-to-one representation of reality is not possible (Weiten, 2014) and necessarily results in a simplified perspective on reality. These representations are referred to as mental models (Gharajedaghi, 2011; Meadows, 2008). Personal knowledge of the world is a model approximating the complex systems that people have to deal with. As Mcbride (2005) explains, "metaphors and models provide the basis for interpretive approaches in information systems that seek to draw out patterns and shed light on complex social-technical situations" (Mcbride, 2005: 234).

To explain KMS adoption in organisations, models provide a 'best guess' of the relevant factors of the model. The purpose of an IS model is to explain and predict an individual's adoption intent (Eckhardt, Laumer & Weitzel, 2009). Since complexity increases according to the power law characteristics of complex systems with each incremental

factor added to the model, no model can fully capture the reality of a phenomenon. As the adoption models explain technology adoption with increasing accuracy, technology adoption models necessarily also increase in complexity. It has already been argued in Chapter 1 that a very important rationale for the TOE as a framework is the various levels of analysis inherent to the framework. Figure 2.1 below depicts a schematic of the increased complexity levels within an environment. The individual is the 'simplest' level of complexity, followed by the interface between the individual and technology, followed by an additional layer of the organisation, nested within an environment. KMS adoption does not occur at any of these levels. Still, it is an emergent property from the continuous flow of information between the different levels depicted by the dashed lines at each level. No single model can capture all complexities. Therefore, the factors identified within the different levels are still an oversimplification of reality.

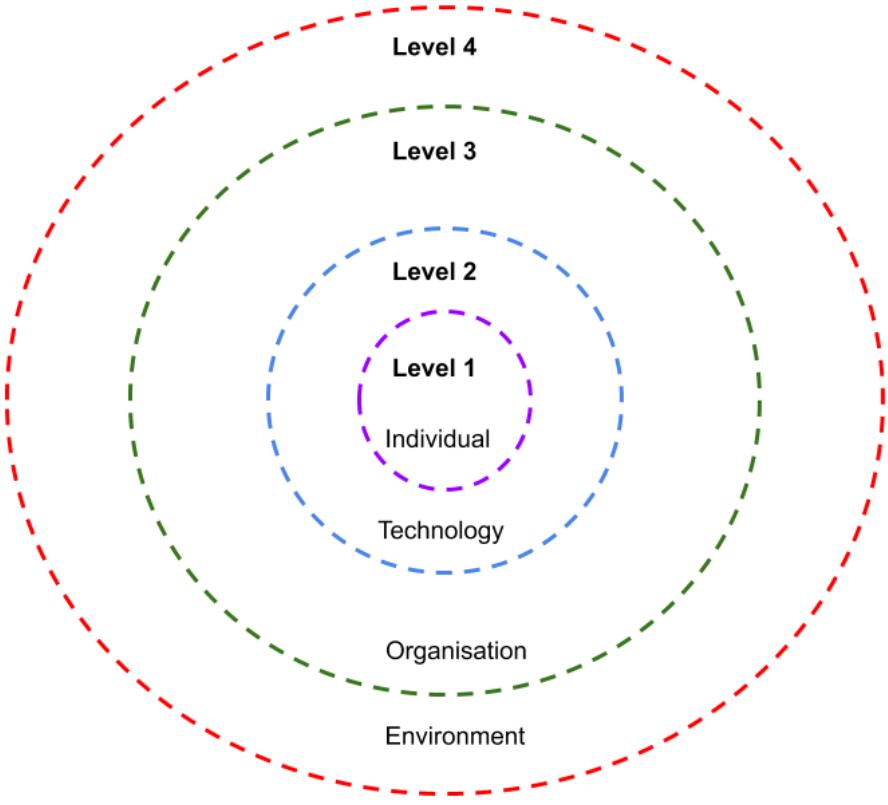

Figure 2.1: A schematic depiction of the increasing levels of complexity an organisation operates within a complexity paradigm (Source: Researcher's own)

2.25. Three States of a system

Closed systems naturally gravitate towards an equilibrium where entropy is at its maximum (Mitchell, 2009). Thus, a closed system ends up being a dead system. By contrast, open systems allow for a continuous flow of information, matter and energy (Preiser, Biggs, Dev Vos & Folke, 2018). Following Henning (2009), the three states of a system will be discussed. Like living systems, the model can be applied to complex adaptive systems since all living systems also function as CASs (Capra, 1996; Mundra, 2018).

2.25.1. Stable equilibrium (SE)

A system is in stable equilibrium when it balances any changes through negative feedback loops (Stacey, 1995). Any change that leads to a disturbance self-corrects by compensating for the change and bringing the system back to its current state. In the context of information systems, an example of a balancing feedback loop would be existing users starting to resist the adoption of a new KMS. Once resistance is noticed, management intervenes with incentive strategies to halt resistance and enhance system adoption. Consequently, the system in SE is characterised by stability yet a lack of novelty, which leads to stable outcomes. However, prolonged periods in such a state lead to the eventual death of the system (Forrest & Mitchell, 2016; Stacey, 1995).

When a KMS is maintained in such a way as to emphasise only the storage and management of existing knowledge in the system, the system will soon become obsolete. As a result, existing ideas cannot interact with new ideas to create emergent insight into contemporary challenges.

2.25.2. Explosive instability (EI)

The state of a system viewed as the opposite of a SE system is a system with an unstable outcome or explosive instability (EI). The system is driven by positive feedback loops resulting in runaway effects if not counterbalanced with negative feedback. The result of explosive instability has been described as the death of the system (Stacey, 1995). An

application of positive feedback loops is social validation effects, whereby a shareholder advocates for a KMS with specific features because their fellow shareholders advocate for the adoption of the KMS purely due to certain likeable features. EI in an organisation can then also result from a KMS not having the correct features and functionality required for users. Thus, employees are unable to conduct their required tasks and responsibilities. This factor further hinders new users from using the KMS, making the KMS even less effective.

2.25.3. Bounded instability (BI)

Systemic change always starts with an initial condition. In the technological context, initial conditions describe the earlier state of the organisation at the beginning of KMS adoption. As the author has indicated, two systems with identical initial conditions will follow different trajectories after a while, eventually leading to an indeterminate, chaotic pattern. Therefore, initial conditions must be considered before the change can commence (as in adopting a new or adapted KMS). Examples include the age, experience, and tenure of employees at the organisation.

Nonlinear feedback systems, including complex adaptive systems (CASs), exhibit two fundamental property characteristics within organisations: spontaneous self-organisation and bounded instability (Stacey, 1995; Vidgen & Wang, 2006).

Self-organising systems are composed of non-linear connections between the system's elements. These connections give rise to feedback loops that either balance or reinforce system parts (Preiser, Biggs, De Vos & Folke, 2018).

The state of bounded instability originates from research on dissipative structures (Prigogine, 1976). 'Dissipation' indicates loss, whereas 'structure' indicates new order (Wheatley, 2006). Such systems move from equilibrium towards disequilibrium up to a critical point of instability far from equilibrium. Beyond that point, the system self-organises to create paradoxically ordered patterns. In a bounded unstable state, order and chaos exist in unison.

The dance between order and chaos has been poetically summarised by Peterson (2018):

> *"Order and chaos are the yang and yin of the famous Taoist symbol: two serpents, head to tail. Order is the white, masculine serpent; Chaos, its black, feminine counterpart. The black dot on the white— and the white in the black— indicate the possibility of transformation: just when things seem secure, the unknown can loom, unexpectedly and large. Conversely, just when everything seems lost, new order can emerge from catastrophe and chaos. For the Taoists, meaning is to be found on the border between the ever-entwined pair. To walk that border is to stay on the path of life, the divine Way (Peterson, 2018: 17)"*

At the border between order and chaos is 'the edge of chaos'. At that particular point, there is a constant shift between creativity and anarchy (Waldrop, 2019). The edge of chaos is a point far from equilibrium where the organisation and the KMS are 'poised' to move towards a point of relatively stable behaviour patterns (i.e., a strange attractor) by the KMS, employees and the organisation. Conversely, behaviour and decisions by top management can lead to points of instability and move the system to a new point of relative stability where the KMS is adopted (Mcbride, 2005).

Whereas SE and EI systems involve dichotomy (black/white; on/off; yes/no), information systems entail a 'both/and' perspective. In managerial thinking, this is referred to as integrative thinking. Integrative thinking is defined by Martin (2009: 22) as the

"ability to face constructively the tension of opposing ideas and, instead of choosing one at the expense of the other, generate a creative resolution of the tension in the form of a new idea that contains elements of the opposing ideas but is superior to each".

Integrative thinking sidesteps trade-offs between one state and the other. Instead, it embraces both states simultaneously to provide the best of both extreme states. Positive feedback ensures instability and novelty, while negative feedback maintains the system's core identity and keeps the system bound to prevent complete runaway. The 'both/and'

of bounded instability is highlighted by Wheatley (2006), adding that behavioural influences depend on relationships between elements in a system, not on the individual or organisation in isolation. The past KMS adoption models emphasise organisational or individual adoption elements. As described in the next chapter, synthesising adoption and critical success factors generates creative, emergent insights not visible from any perspective alone. Dissipative structures imply that organisations should not fear the disorder and chaos that accompanies the adoption of a new KMS. Indeed, it is precisely these conditions that lead to creativity. Moreover, it is precisely these constraints that creativity thrives on (Wheatley, 2006).

On the other hand, organisations that allow their KMS to exist in a SE state may soon find that the system leads to obsolescence, passivity, and invariance. In a state of bounded instability, novelty and innovation thrive (Henning, 2009). But, as Holland (2014) points out, CASs produce perpetual novelty.

Mcbride (2005), using chaos theory, describes the implementation and use of an IS as a collection of initial conditions, a series of choices or non-choices, and a collection of actions resulting from choice and environmental effects. Furthermore, it is a collection of strange attractors towards which organisational behaviour concerned with interaction with the information system tends (i.e., KMS adoption); and a set of outcome basins within which many strange attractors occur. Figure 2.2 depicts three states of a CAS.

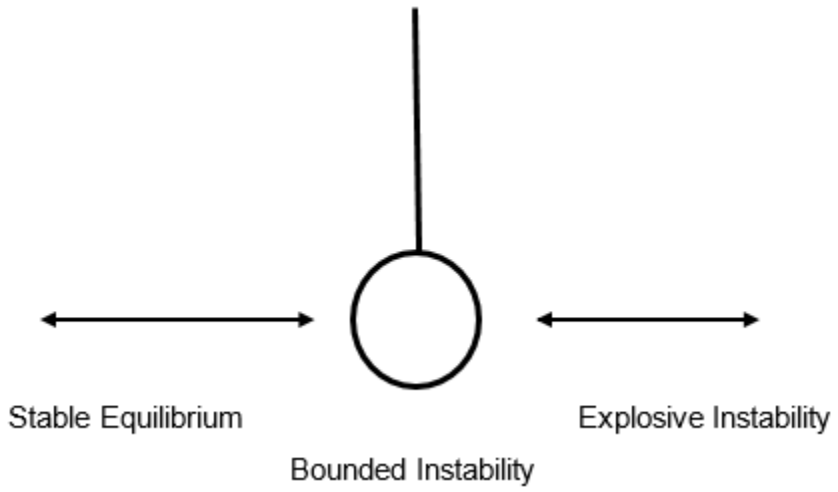

Figure 2.2: Three states of a complex adaptive system (Source: Henning, 2009)

2.26. Knowledge management system adoption as an emergent process

In the preceding sections, two main paradigms were considered. The emergence of the Newtonian-Cartesian paradigm gave way to the Einsteinian-Quantum paradigm (Laloux, 2014). The former is associated with the illusion of perfect determinism and certainty, whereas the latter is characterised by probabilistic predictions of systemic behaviour (Greene, 2004). The appearance of systems thinking and complexity science a few decades hence, changed people's view on interactions and predictions of phenomena.

Systems can display wildly complex behaviour through interaction. Elements are related to each other through connections and thus have particular relationships. Out-of-ordered elements, when working together, can emerge patterns of organisation that are more than the sum of its parts. Systems that interact with other systems in their environment results in the emergence of a new level of organisation (Holland, 2014; Waldrop, 2019). The multilevel perspective of the TOE as a KMS adoption framework is consistent with the nested nature of subsystems and suprasystems. Confining adoption to a single subsystem neglects the interconnectedness of the other systems.

In contrast, all contexts (behavioural, technological, organisational, and environmental) may contribute to successful KMS adoption. Consequently, KMS adoption does not involve any single context in particular but requires the interaction of contexts on different levels. Thus, KMS adoption emerges from local and global interaction of systems and subsystems.

2.27. Synthesis of discussion

Ancient philosophers were motivated to believe that sense-experience provides humans with objective 'facts' about the outside world. Over time, the naïve realists fragmented into different schools of thought, hinting that knowledge cannot be truly objective in the ontological sense. For example, the Relevant Alternatives' theory of knowledge from the contextualists claims knowledge to be context specific.

From the discussions above, it can be argued what humans claim as ‘certainty’ is not based on objective facts ‘out there’ in the world. Instead, it is based on a feeling of ‘rightness’ originating in the brain, not reason or logic (Burton, 2008). Hence, interpretivism is the philosophical stance advocated in the study, acknowledging the role of humans as social actors as part of the reality-creating process. Reality is thus interpreted by humans and acted upon (Saunders et al. 2015). Very little reality is independent of social actors that constitute human world ontology.

Interpretations of the world within a socio-historical context endow the human mind with a particular dominant metaphor. The advent of the industrial revolution led the way for ‘man as a machine’ (Nonaka, 1991; Henning, 2009), being part of an even bigger machine. Over the last few decades, this metaphor has been replaced by living systems. There is little space for non-linearity, which oversimplifies cause and effect and neglects holistic investigations.

The new quantum worldview has further emphasised probability over certainty and non-determinism over determinism.

The metaphor in this study presents the organisation as a complex adaptive system characterised by complexity, adaptability and co-evolution (Holland, 2014). From the three states a CAS can inhabit, the ideal is one of ‘bounded instability’ where homeostasis resides ‘far from equilibrium’ in a place between order and disorder (Henning, 2009). In a technology context, technology adoption spontaneously emerges as interdependent influences simultaneously inhibit and reinforce each other to allow an adoption to emerge.

Table 2.4: Summary of theories and authors discussed as a basis for the philosophical stance and theoretical framework

Author	Theory/ Premise
Gettier (1963)	Challenged the idea of knowledge as ‘True justified belief’

Author	Theory/ Premise
Hebb (1949)	Identified the associative nature of brain cell connections, contributing to the basis for human metaphoric thinking
Lakoff & Johnson (1980) Geary (2011)	The authors argue for the neural basis of metaphoric thinking based on the human brain's assosiative nature. This associative nature and limited processing power of the human brain gives rise to the interpretative nature in judgements and decision-making (for example through the use of biases, heuristics and fallacies).
Tavris & Aronson (2020)	As part of the subjective nature of human experience, humans implicitly or explicitly rationalise decisions
Burton (2008) Barrett (2017)	The authors assert that what we experience as 'certainty' (akin to absolute true belief), are, in fact, feelings generated by the brain. Thus, what humans perceive as conviction are subjective experience mascurading as absolute, objective truth.
Von Bertalanffy's (1968) Meadows (2008) Gharajedaghi (2011) Capra (1996) Mitchell (2009) Wheatley (2006) Anish & Gupta (2014); Prigogine, (1977)	A summary of prominent authors in the field of systems thinking, commencing in earnest with the work of von Bertalanffy (1968). The integrative nature of elements within a system means that these elements should be studied holistically as opposed to a reductionistic approach advocated based on a Newtonian worldview.
Kauffman (2019) Waldrop (2019)	Complexity theory was considered as a theoretical lens along systems thinking. For the researcher, an

Author	Theory/ Premise
Holland (2014) Hammond (2019) Anderson (1972) Serrat (2021) Arnold & Wade, 2015) Preiser (2018) Stacey (2003) Preiser, Biggs, Dev Vos & Folke (2018) Henning (2009)	SME is a complex adaptive system (CAS), characterised, for example, by interconnected elements, adaptability and co-evolution.

2.28. Conclusion

The preceding paragraphs suggested that epistemologically, adequate knowledge is context-dependent. Absolute objective knowledge includes positivism in its strictest sense. On the other hand, knowledge is contextualised as subjective interpretivist knowledge. Ontologically, interpretivism also allows for the meaning people attribute to their own roles (subjectivity) and as part of a group with the same beliefs (intersubjectivity). Therefore, Interpretivism were utilised as a paradigm for this study.

This chapter utilised concepts from complexity theory as a theoretical lens to view the organisation and KMS adoption. Borrowing from the literature on dissipative structures, organisational adoption of a KMS happens at the ‘edge of chaos’ where the organisation, as part of a CAS, is far from experiencing equilibrium. Such a state involves positive and negative feedback loops and constant interaction between interdependent parts.

The next chapter reviews the technology adoption and critical success factors (CSF) literature. Following the identified propositions, a subsequent preliminary theoretical framework were devised from the appropriate literature that will guide the conceptual choice of the preliminary theoretical framework.

3. CHAPTER 3: A REVIEW OF TECHNOLOGY ADOPTION AND KNOWLEDGE MANAGEMENT LITERATURE TOWARDS THE CONSTRUCTION OF A CONCEPTUAL FRAMEWORK

This chapter aims to review the extant literature on technology adoption models and the critical success factors of technology adoption. Where appropriate, a specific focus will be placed on knowledge management system (KMS) adoption frameworks and models. Determinants of the adoption of knowledge management systems will be explained. After that, a theoretical framework for KMS adoption will be constructed, specifically for small and medium enterprises (SMEs).

3.1. Introduction

Given that IT plays a crucial role in the knowledge economy, it is surprising that so little focus has been placed on IT in South African SMEs, including but not limited to the adoption of cloud computing (Osembe & Padayachee, 2016). It is a concern since IT markets for these technologies have increased considerably over the last few years. One does not need to frequent analytical datasheets to become aware of the eruption in access to the global cloud market to notice the expansion in cloud services (Bartoletti, 2021; Hinde & van Belle, 2012). Studies in a South African SME context related to IT adoption have also been limited (Mathu & Tlare, 2017). However, it is argued that technologies such as cloud computing can increase competitive advantage even in rural areas. KMSs often embed cloud computing as part of the solution. Global technology interconnectedness and the fast dissemination of information have increased market competitiveness in the business environment. Fortunately, these technologies can also add value to organisations in the form of knowledge management, including SMEs. Thus, it is important to gain deeper insight into why KMS adoption fails, which factors lead to KMS adoption, and how to improve KMS in an SME context.

3.2. Individual-level adoption frameworks

Endeavours to explain behaviour have been the forte of many ancient philosophers, such as Plato, Seneca and Aristotle (Robinson, 1995; Nussbaum & Rorty, 1992). Predicting behaviour, in contrast, has been more difficult. Nevertheless, human behaviour as a complex process has been recognised intuitively for centuries.

One of the first attempts to model human behaviour was by Ajzen and Fishbein (1975) with their Theory of Reasoned Action (TRA). According to the TRA, behaviour is determined directly by a person's behavioural intention (BI). BI, in turn, is determined by two factors: attitude towards the behaviour (A); and subjective norm (SN). The former is again determined by behavioural beliefs and outcomes, whereas the latter is determined by normative beliefs and motivation to comply (Davis, Bagozzi & Warshaw, 1989). As the TRA aims to model behaviour that is not context-specific, it has been widely used in numerous studies (Madden & Ajzen, 1992). However, a limitation of the TRA is that it assumes that most behaviour is under volitional control. Thus, behaviour can be solely predicted from BI.

The TRA was expanded by the Theory of Planned Behaviour (TPB) to correct the limitation. The TPB added the construct of perceived behavioural control (PBC) for situations where a person does not have complete control over behaviour in a situation (Ajzen, 1991; Ajzen, 2002; Madden & Ajzen, 1992). PBC was defined by Ajzen (1991: 188) as "people's perception of the ease or difficulty of performing the behaviour of interest". The PBC can be broken down into three constituent parts: self-efficacy (SE) (Taylor & Todd 1995), perceived ease of use (PEOU) (Ajzen 1991; Mathieson 1991), and availability (Hsieh, Rai & Keil, 2008). PBC, as an addition, makes intuitive sense. For example, suppose a street-corner cafe owner endeavours to persuade his loyal customers to try out a new doughnut he has just developed. In that case, he will have limited control over what reciprocal sales tactics his competitors across the street will come up with.

As mentioned in the previous paragraphs, the TRA is a general model not applicable to any particular context. To partly address this gap, Davis (1986) developed the technology

acceptance model (TAM) from the TRA (Venkatesh & Davis, 2000; Buchanan, Sainter & Saunders, 2013) to specifically focus on computer adoption behaviour. The TAM overlaps with the TRA by including attitude, behavioural intention and actual use. It does, however, not include subjective norm (SN) in the TRA as a determinant of BI. In addition, Davis, Bagozzi and Warshaw (1989: 985) stated that end-user computing technologies and user populations comprise a broad range of technologies and users.

The purpose of the TAM was to develop an IT adoption model that caters explicitly for individual adoption (Venkatesh & Bala, 2008; Buchanan, Sainter & Saunders, 2013) in its traditional form and as modified by others (Awa, Ukoha & Emecheta, 2016). The TAM has been able to explain a large amount of the variance in users' behavioural intentions and adoption across many different contexts (Taylor & Todd, 1995). In the TAM, two beliefs determine a person's attitude: Perceived usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to a prospective user's subjective probability that using a specific application system will increase their job performance in an organisational context. PEOU is the subjective degree to which the user expects the technology to be free from effort. PEOU, in turn, is influenced by attitude through instrumentality and self-efficacy (Davis, Bagozzi & Warshaw 1989). Davis linked perceived ease of use to self-efficacy because of his opinion that ease of use created a similar outcome judgment (Straub, 2009). According to Bandura's (1986: 391) social cognitive theory, self-efficacy refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances". The easier a technology is to use, the more it will be perceived as applicable (Venkatesh, 2000).

The preceding paragraphs focused on literature depicting the role of belief in accomplishing a task for its successful execution. Authors have argued for competence to be differentially conceptualised as perceived ease of use or self-efficacy. Irrespective, the role of a behavioural component in technology adoption warrants investigation.

3.3. Organisation-level adoption frameworks

Technology adoption models can be organised at either the individual or organisational levels. Several models have been used to explain and predict technology adoption, including in IS. Some IS models have been applied to large organisations, while others (Ramdani, Kawalek & Lorenzo, 2009) have been used to study IS adoption in SMEs. Initial adoption models such as the Technology Acceptance Model (TAM, TAM 2 and TAM 3) and the Unified Theory of Acceptance and Use of Technology (UTAUT and UTAUT 2) focus on individual-level adoption. The majority of literature on technological adoption at the organisational level involves either one or both of two frameworks, namely, the diffusion of innovation (DOI) and Tornatzky and Fleischer's (1990) technology-organisation-environment (TOE) framework (Oliveira & Martins, 2011; Hoti, 2015). Many studies of organisational-level adoption have referred to the (TOE) framework (Bhattacharya & Wamba, 2015). One reason is that the TOE framework has been studied extensively in various contexts (Ifinedo, 2011; Wang, Li, Li & Zhang, 2016; Zheng, 2014). It has been considered a rigorous framework and a suitable alternative for studying IT/IS adoption at the organisational level (Baker, 2011; Alatawi, Dwivedi, Williams & Rana, 2012; Eze, 2022). In line with a holistic perspective, the TOE framework were integrated with the DOI framework. Arguing in favour of combining models as opposed to utilising only a single (mental) model, Hollins (2019) asserts that "multiple models challenge each other to produce a more unified overview, whereas using one or two restrict people's long-range view to a limited context or discipline" (Location 143).

Hoti (2015) agrees with Oliveira, Thomas and Espandal (2014) that Rogers' DOI theory should be combined with additional contexts or factors to provide a more holistic approach. Chapter 2 detailed the theoretical foundation of this study, characterised by holism and interrelated, interconnected and interactive views of systems. The holistic nature of the TOE takes into consideration different levels of contexts (i.e., technological, organisational, and environmental (Alatawi, Dwivedi, Williams & Rana, 2016), and is therefore well suited towards the theoretical framework of this study (i.e., complex adaptive systems). Thus, factors identified to form part of the integrated framework will also be assessed for applicability within the study's theoretical paradigm.

From here, it is possible to sketch the context in which change is assumed to happen for KMS adoption. For some change efforts, a focus on the internal environment is essential, while for others, the external environment is important (Oliveira & Martins, 2011). This study focuses on both the internal and external environments, as both have been shown in past literature to affect IT systems adoption significantly. The context within which the adoption takes place can significantly enhance or impede the adoption process. The TOE-DOI is, therefore, an appropriate framework for focusing attention on both the internal and external environment. This framework will now be further discussed.

3.4. The Technology-Organisation-Environment (TOE) framework

The TOE framework was developed by Tornatzky and Fleisher (1990) as a framework through which an organisation can adopt an innovation (Alharbi., Atkins & Stanier, 2016). The framework comprises three contexts that affect the adoption process: the technological, organisational and environmental. The TOE framework has been used to study successful IT/IS adoption in various contexts. However, no empirical models could be found utilising organisational-level IT adoption models in the context of KMS adoption in the general and public sectors (Alatawi et al*.,* 2012). The different contexts will be more comprehensively discussed when the factors for KMS adoption are determined. Figure 3.3 depicts the original TOE framework.

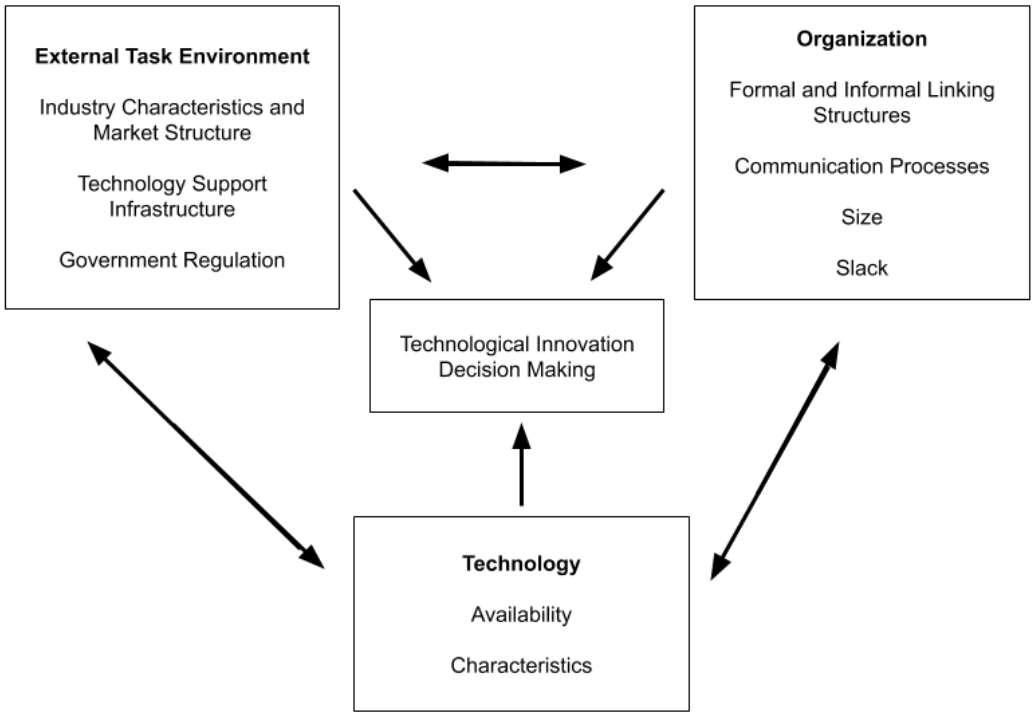

Figure 3.3: Technology-organisation-environment framework (Source: Tornatzky & Fleischer, 1990)

Further justification for the TOE framework was taken into account. Firstly, the framework fits into the organisation as a complex adaptive process (Chapter 2). KMSs involve integrating and cooperating with systems at various levels of the organisation. The systems are interconnected with other environmental systems; therefore, an interrelationship exists between them. By their nature, as these systems are interdependent, they mutually influence each other (Sammut-Bonnici, 2015).

Secondly, in line with a CAS where many elements influence many additional elements and inhibit or enhance their effect through positive and negative feedback loops, the variety of factors, contexts, industries, and sizes of organisations implies that every KMS adoption will be unique. Even though some factors might overlap with an organisation of similar size, the specific factors influencing adoption are ultimately non-deterministic.

Thirdly, organisational change always happens within a particular context. As mentioned, a particular organisation can be defined in terms of its unique characteristics, such as size, culture, organisational support and competitive environment. For KMS adoption,

different factors will necessarily apply than for an Enterprise Resource Planning (ERP) system. Similarly, due to scale variance, organisational size affects the complexity of change the system would need to endure.

The TOE produced a robust framework under changes in different contexts (Dwivedi et al., 2015; Awa & Ojiabo, 2016; Kumar, Singh & Swain, 2022). Therefore, it is reasonable to deduce that the TOE would be an appropriate framework to investigate KMS adoption as a unique input to the literature.

A wide variety of factors is included under the respective TOE contexts. Apart from the plethora of factors summarised by Wang and Wang (2016), Lin (2014) included IT support and IT effectiveness in the technology context. Top management support, reward system and sharing culture were included under organisational support. Under the environmental context, competitive pressure was added as a factor.

Two reasonably recent literature reviews of the TOE framework are from Elghdban, Azmy, Zulkiple, and Al-Sharafi (2020) and Bryan and Zuva (2021), with comprehensive reviews by Oliveira and Martins (2011) and Arpaci, Yardimci, Ozkan and Turetken (2012). These studies reviewed literature that involved the TOE on its own and an integral part of other models (e.g., DOI and Institutional theory).

Cloud computing is defined as “applications delivered as services over the Internet and the hardware and systems software in the data centres that provide those services” (Tarhini, Al-Gharbi, Badi & AlHinai, 2018: 50). As such, cloud computing is a technology that allows users access to files or websites from any place where there is an available internet connection. Its influence has therefore permeated the realm of information systems, including KMSs. In recent years, cloud computing has grown tremendously to be used as a service for many IT solutions, including KMSs. The global cloud infrastructure market grew by 46% in the fourth quarter of 2018 (Canalys, 2019). As many KMSs today are cloud-based systems, cloud computing research will be integral to the KMS adoption factor.

In their research, Al-Hujran, Al-Lozi, Al-Debei and Magableh (2018) aimed to generalise their cloud computing adoption findings. Interviews were held with experts from organisations across Jordan. A total of six in-depth interviews were conducted. As hypothesised, salient factors were found in all three contexts of the TOE framework. The technological context factors were security, privacy, trust, and compatibility & integration requirements. Organisational culture, top management support, and CEO characteristics were identified in the organisational context. Finally, factors salient in the environmental context included regulatory frameworks and service level agreements as contractual agreements between the cloud services provider and the company receiving the service.

Researchers have suggested the existence of significant technological, organisational, and environmental challenges facing KMS adoption, although much of the research was conducted in large organisations as opposed to SMEs, with a few exceptions (such as Gresty, 2013; Shrafat, 2018, Wang & Wang, 2016). Gono, Harindranath, Ozcan and Holloway (2016) emphasised a compelling need for specific ICT adoption research in the SME context. However, few, if any, studies have investigated an adapted and integrated TOE/DOI framework in SMEs. The study will aim to contribute by considering such a framework.

Through a review of the literature from 2004 until 2015, Hoti (2015) identified various TOE factors in information system (IS) adoption for SMEs. The most prominent factors are listed in Table 3.4. In the technological context, the most important factors were relative advantage, complexity, and compatibility. In the organisational context, top management support, organisational readiness, managerial time, information intensity, and product characteristics were the most prevalent factors. Finally, environmental factors found to be the most prevalent were competitive pressure, government pressure/support, consumer readiness and technology vendor support. Other variables which did not fit into the TOE framework but were included by various authors were IS knowledge and innovativeness. The study concludes by emphasising the implications for SME managers explained by Hoti (2015: 9) as "*The adoption of IS innovations is clearly affected by the technological, organizational, and environmental contexts of the enterprise*" (Hoti, 2015: 9).

Even though a limited number of studies found some factors (e.g., complexity) insignificant, the vast majority found these factors significant in various IS contexts. However, of all IS studies reviewed by Hoti (2015), only one study investigated knowledge management systems. Thus, a need exists for further analysis of KMSs utilising the TOE for KMSs. Table 3.4 below sets out the elements of the respective contexts in the TOE framework.

Table 3.5: Elements of the respective contexts in the TOE framework (Source: Adapted from Hoti, 2015)

Context	**Construct**
Technological context	1. Relative advantage
	2. Compatibility
	3. Complexity
Organisational context	1. Top management support
	2. Organisational readiness
	3. Financial and technical resources
Environmental context	1. Industry pressure
	2. Government pressure
	3. Consumer readiness

Pool, Arabzad, Asadi and Ansari (2015) applied the TOE to radio frequency identification (RFID) adoption and found among 213 SME managers that RFID adoption depends on all three TOE contexts. Azyabi et al. (2019) investigated KM diffusion in Saudi Arabian SMEs. Using the TOE framework, they found that only IT support, IT effectiveness and reward were significant. Top management, sharing knowledge and competition were found to be insignificant, though no explanations were offered. The authors argued that the TOE framework is a noteworthy framework for RFID adoption.

Researchers have investigated KMS adoption in different countries (Margilaj & Bello, 2015; Lee, Wang, Lim & Peng, 2009; Dei, 2017; Tamez, 2014). Evidence that different factors apply to technology adoption for small organisations as opposed to large organisations was found by Rahayu & Day (2015). As expected, different studies found different important factors depending on the research context. Given the scant research on KMS adoption in SMEs within a South African context,

Driven by the need to fill the gap in IT adoption at the organisational level, Oliveira and Martins (2011) reviewed IT adoption models to close the gap between individual-level and organisational-level IT adoption. As part of organisational-level adoption models, studies involving the TOE and DOI were reviewed. In comparing the DOI to the TOE, the authors asserted that the TOE provides a better explanation of intra-organisation adoption since it includes an environmental component. The TOE and DOI differ in that individual characteristics in the DOI correspond to the technological context in the TOE. In contrast, the DOI's internal and external characteristics correspond to the TOE's organisational context (Oliveira & Martins, 2011). The DOI identified five technological factors: relative advantage, compatibility, trialability, complexity, and observability. Leadership characteristics were associated with organisational factors in the TOE, whilst external characteristics were associated with the external environment in the TOE framework.

In summary, the DOI theory indicates consistency with the TOE framework (Adam, Wassermann & Blewett, 2015; Tom, Virgiyanti & Roziani, 2019). The respective contexts will be described in more detail as part of the preliminary framework in Figure 3.5.

3.5. Criticism and limitations of the Technology-Organisations-Environment (TOE) framework and Diffusion of Innovation (DOI) Theory

Wang, Wang and Yang (2010) highlighted three further criticisms of the TOE framework. Firstly, it does not specify the main constructs in each context. Secondly, the authors emphasised that context considerably influences the variables included in the framework. However, they noted that the TOE is an appropriate departure for analysing relevant

adoption factors, given its empirical support. Lastly, the factors in each context differ between studies, making comparison difficult. As reported by Musawa and Wahab (2012), the TOE acts only as a hierarchy for integrating concepts into a framework for adopting technology. The constructs also possess limited explanatory power in contexts such as EDI adoption.

Ghobakhloo and Tang (2013) cited a lack of individual factors from employees and managers as a concern. In line with other authors, Bryan and Zuva (2021) suggested that the factors as part of the TOE are context-specific. As such, the authors suggested that other variables be included. For example, technology readiness, managerial capabilities of change management, technology infrastructure, organisational culture and cognitive variables are needed to improve the TOE framework. For this reason, a human behavioural context is added to the framework to fill the gap.

Regarding the DOI theory, Tarhini, Arachchilage, Masa'deh and Abbasi (2015: 62) critically reviewed IS adoption models and underlined the DOI theory's limitations:

"… *the DOI fails to link between the innovation properties and a proper expected attitude. One solution to remedy such a problem is to propose theories taking into account the process of developing attitude*".

The following section outlines salient factors identified in the technology adoption and critical success factor literature.

3.6. Defining knowledge management systems

One of the most often-cited definitions of KMS is that of Alavi and Leidner (2001: 114), which state that

"*Knowledge management systems (KMSs) are information systems applied to managing organizational knowledge. They are IT-based systems developed to support and enhance*

the organizational processes of knowledge creation, storage/retrieval, transfer, and application".

The emphasis is on KMSs being IT-based systems (Bali, Wickramasinghe & Lehaney, 2009; Chen & Nonaka, 2022). However, Maier (2008: 542) offered a more comprehensive definition encompassing all elements mentioned above while also including the functions of a KMS.

"*A KMS is not an application system targeted at a single KM initiative, but a platform that can be used either as is to support knowledge processes or as the integrating base system and repository on which KM application systems are built.*"

Thus, a contemporary definition of KMSs encompasses components of IT, IS and ICTs either in part or as a whole. If combined, knowledge management systems were explained as

IT-based systems to create, store, retrieve, transfer, and apply knowledge management to enhance the organisation's KM processes.

3.7. Knowledge management systems: a holistic view

Any system, whether living or inanimate, can be defined as a "combination of connected and interacting elements, which are organized in a certain way to achieve a stated purpose and which are separated from their environment by a system boundary" (Unverborden, Bohm & Luder, 2019: 19). Thus, a system is not just the sum of its parts, but rather the sum of its interactions (Shaked & Schechter, 2017). As such, the study views KMSs as part of an organisational system, which is part of a larger system – the environment – to achieve the stated purpose of managing organisational knowledge.

In addition, knowledge processes (i.e., creation, storage/retrieval, transfer and application) are essential to effective organisational knowledge management. An effective KMS is vital in retaining current knowledge and capturing new knowledge

(Nonaka, 2005). Therefore, IT is an essential part of knowledge management today. IT has three general applications to the management of organisational knowledge: the creation of organisational knowledge directories, the coding and sharing of best practices, and the creation of knowledge networks (Nonaka, 2005). As part of KM, IT only plays a supporting role in KM endeavours and therefore does not ensure adoption (Arisha & Ragab, 2013). However, IT is a key enabler of KMS implementation (Wong & Aspinwall, 2005; Indrajit et al., 2018; Gresty, 2013). IT has expanded considerably to include ICT, cloud computing, e-commerce, content management, and knowledge management systems.

In contrast to organisations competing based on access to tangible resources (e.g., natural resources such as gold or oil), businesses are increasingly competing based on intangible assets, including knowledge (Harari, 2014). Therefore, organisations should compete based on superior knowledge resources (Hu, 2010). With the recognition of the importance of organisational knowledge management (KM), such as improving managing change capabilities and improving knowledge flow (Mazorodze, Buckley, 2019), researchers have paid increasing attention to knowledge management systems (KMS). A KMS allows for the application of the organisation's existing knowledge and the acquisition of new knowledge. The KMS, in turn, allows management to effectively leverage organisational knowledge resources through knowledge creation, collection and sharing. Although given the time and resources (e.g., financial and human) expended to adopt and implement a KMS, it is imperative to be made a top priority (Kuo, Lai & Lee, 2011).

Knowledge management systems have also benefited organisations, most notably by improving employee performance in both efficiency and quality (Mandal & Bagchi, 2016). Other benefits of adopting a KMS include improved organisational adaptability, performance, flexibility, and learning skills (Hafidz & Sensuse, 2019).

3.8. Knowledge management and SMEs

Small and Medium Enterprises (SMEs) play a pivotal role in modern society, politics and national economies, as they are the base for entrepreneurial skills, employment and innovation (Mishra, 2019). SMEs total more than 90% of national economies worldwide. Fifty-six per cent of employment in the private sector originates from SMEs (IFC, 2018). In South Africa, SMEs constitute 91% of the formal sector, employ between 50% and 60% of the labour force (McKinsey, 2020), and their total economic output accounts for more than a third of the gross domestic product (GDP) (McKinsey, 2020). South African SMEs make a crucial contribution to the economy. With the growth in SMEs, the contributions of SMEs are set to increase. With increased competition and consumer demands, SMEs need to remain competitive by increasing innovation (Sarina, 2018). Accordingly, in the era of the knowledge economy, Awa, Ukoha and Emecheta (2016: 572) stated that

"*the core competence for SMEs' survival and growth involves the creation and sharing of knowledge and information; and innovating, learning and adapting to changes through the strategic deployment of knowledge capital*."

SMEs stand to acquire significant competitive advantages by implementing a KMS, as these contribute to customer satisfaction, employee development, creativity, and relationships with external stakeholders (Edvardsson & Durst, 2013).

The efficacy of knowledge management is significantly diminished when it does not diffuse through organisations. SMEs, who are disadvantaged compared to large organisations due to their smaller resource pool, can benefit significantly from better diffusion of KM. The knowledge management system needed by SMEs must relate to their objectives to provide the organisation with proper knowledge and benefits. This source also provides several other key elements that a small and medium-sized enterprise should consider when implementing a knowledge management system. In particular, a critical success factor is a need for strong managerial support of a KMS implementation. For SMEs, KMSs have the potential and functions to act as an important growth factor, communicating with internal and external stakeholders, improving

communication, opening up new possibilities and widely disseminating information to customers. Thereby, KMSs drive increased sales, productivity and customer satisfaction while reducing costs. A KMS can also improve accessibility to information, provide a platform where continuous improvement of the procedures can occur, users can learn from mistakes and reduce the duplication of expertise, among others (Hassan, 2020; Lisanti, Luhukay & Mariani, 2014; Vukasinovic, Vasić, D. & Tavčar, 2018).

Azyabi (2019) investigated KM diffusion (adoption and implementation) in Saudi Arabian SMEs. Using the TOE framework, they found that only IT support, IT effectiveness, and reward significantly affected KMS adoption and implementation. Top management sharing knowledge and competitiveness were found to be not significant.

Given the plethora of factors which can influence KMS adoption, Hassan (2020) concluded that KMS adoption needs a variety of perspectives, insights, and expert knowledge to deliver successful KMS adoption.

Consequently, the requirement for knowledge management to be successful in organisations is implementing knowledge management systems (KMSs) (Orenga-Roglá & Chalmeta, 2017). Furthermore, given the large proportion of SMEs that contribute to economies worldwide and in South Africa (OECD, 2004; Massaro *et al*., 2016), the use of knowledge management systems (KMS) provides a way for SMEs to compete with large organisations.

As South Africa starts to emerge towards a developed country, it will rely more on knowledge as a resource. However, Durst and Edvardsson (2012) asserted that the knowledge management (KM) literature in the context of SMEs was still limited. Furthermore, in their literature survey, Massaro *et al*. (2016) found only ten authors wrote more than one article on knowledge management. Thus, one of this study's unique contributions were investigating the use of knowledge management systems in SMEs.

Over the years, there could be very little dispute that organisations that practice knowledge management possess a major competitive advantage over other organisations that do not engage in KM practices (Nonaka, 1991; Desouza, 2003; Gourova, 2010;

Arisha & Ragab, 2013; Suryawan, Putra & Pratiwi, 2015; Wijaya & Suasih, 2020). Moreover, in the 'knowledge economy', knowledge creation and distribution are accelerating (Ziegler, 2022). Yet, knowledge management has emerged as an essential yet understudied field for SMEs (Massaro *et al*., 2016; Durst & Edvardsson, 2012). Furthermore, factors affecting KM and KMS adoption in SMEs have received very little attention (Fink & Ploder, 2009; Sharafat, 2018), providing an impetus for further investigation. It would therefore be appropriate to determine the current stance of KMS adoption in SMEs (Centobelli, Cerchione & Esposito, 2019).

Large organisations make up the bulk of these studies, while only a few studies aimed to identify factors that influence KMS adoption in SMEs (Gresty, 2013; Wang & Wang, 2016; Shrafat, 2018). Some studies focused on e-learning (Fleming, Becker & Newton, 2017), IT/IS (Polites & Karahanna, 2012) and knowledge management systems (Kuo, Lai & Lee, 2011; Lin, 2013; Tsai & Hung, 2016). Other researchers performed country-specific studies, such as Saudi Arabia (Alatawi et al., 2012), Ghana (Dei, 2017), China (Lee, Wang, Lim & Peng, 2009) and Mexico (Tamez, 2014).

Shrafat's (2018) study aimed to improve the understanding of KMS adoption factors in SMEs while conducting research in Jordanian organisations. Shrafat first performed an extensive literature review and then interviews with industry experts. The findings indicated that knowledge sharing, organizational learning, knowledge management capabilities, and IT capabilities are the most significant. In addition, the author noted that similar studies found leadership, top management support and IT infrastructure to be the most important KMS adoption factors (Chan & Chao, 2008; Chua & Lam, 2005), albeit not in an SME context.

In summary, three important points have been raised. Firstly, as the competition for resources relocates from the predominantly tangible to the intangible, knowledge is becoming an indisputable competitive advantage for organisations of all sizes. Second, SMEs significantly contribute to developing nations' GDP, including South Africa, and therefore need KMS adoption in the knowledge economy. Thirdly, studies about the factors that influence KMSs in SMEs are sparse. Many factors influence the adoption of

KMSs, particularly in SMEs (Shrafat, 2018). Therefore, this study will aim to contribute to the body of knowledge by identifying some of these KMS factors.

According to Rao, Nandini and Zachariah (2022), SMEs' lack of technology adoption can be attributed to unsuccessful management skills and a lack of resources for innovation. In SMEs, knowledge is an invaluable tool for gaining and sustaining a competitive advantage and a revenue-creating resource (Hassan, 2020; Omerzel, Biloslavo & Trnavcevic, 2010). Regardless of size, organisations with more intensive KM processes are more likely to maintain a competitive advantage (Soniewicki & Paliskiewicz. 2019). Therefore, as SMEs deal with their internal know-how, they must practice KM. In addition, to prevent the failure of KM adoption practices, SMEs must become aware of Critical Success Factors (CSFs) (Rao, Nandini and Zachariah (2022). In line with these recommendations, CSFs form part of the literature investigating their role in KMS adoption.

Now more than ever, the need for institutional knowledge management is compelling worldwide. The freelance population is currently totalling around 1.1 billion. In addition, the COVID-19 pandemic has increased the number of freelance workers who have become more flexible and can work for different companies in the same industry worldwide (including competitors). Therefore, it is paramount that SMEs retain existing institutional knowledge and ensure that the appropriate knowledge management tools and practices are in place. In part, this could assist SMEs in gaining superior customer insights above those of their competitors. In general, KM contributes significantly to job satisfaction of employees and managers (Kianto, Vanhala & Heilmann, 2016). Furthermore, Staats (2018) asserted that information and communication technology (ICT), together with technological automation, rapid and continuous change, and globalisation, force individuals to become ‘dynamic learners’ (as part of the organisation).

Having argued for the need towards KM in organisations and the pervasive role of SMEs in the economy, it is of little surprise that knowledge management plays a crucial role in SMEs' innovation capabilities (Gwena & Chinyamurindi, 2018). As mentioned, SMEs are not “little big organisations” (Llic et al., 2022; Coyte, 2012; Olejnik, 2013; Evangelista,

2010). As such, SMEs are likely to experience different dynamics when adopting KMSs as opposed to adoption by large organisations.

Knowledge management has benefits for both large and small organisations. Large organisations can leverage capital and available resources in ways that small organisations would find more complicated, such as implementing information systems (IS) and experiencing a greater likelihood of recovering from IS failure. Simultaneously, it makes KM processes for SMEs more important to gain a competitive advantage and more challenging. SMEs, on the other hand, do not possess these scaling benefits. They are not simply scaled-down versions of large organisations in terms of, for example, risk of failure and education about IS (Kaun & Chau, 2001; Olejnik, 2013; Llic et al., 2022).

In the past, SMEs were slow to adopt information technology (Hoti, 2015). It is concerning, considering that SMEs are also more vulnerable to exploiting intellectual property by larger corporations. SMEs, conversely, have less access to capital and, therefore, the necessary systems to capture knowledge. Yet, paradoxically, SMEs have a greater need to manage organisational knowledge in a competitive environment as they have fewer resources at their disposal (Durst & Edvardsson, 2012).

The failure rate of SMEs in South Africa ranks as some of the highest in the world at close to 75% (Fatoki & Garwe, 2010; Adeniran & Johnston, 2011). In part, the failure of South African SMEs can be attributed to a shortage of technology and capital resources (Osembe & Padayachee, 2016). In addition, the Coronavirus pandemic hit SMEs hardest of all organisations. As a result, many had to lay off employees; even worse, many more are closing their doors for good. It happened while the Reserve Bank expected the GDP to contract by 5.8% in 2020 (Matwadia, 2020).

Given this bleak short-term outlook, in the context of the knowledge economy and the available IS tools expedited by technological advances, KMS adoption may contribute positively towards SME survival and success. However, an obvious benefit does not always lead to technology adoption. These instances further illustrate the need for SMEs to capture knowledge with the appropriate technologies to remain competitive with large organisations.

3.8.1. Knowledge management system adoption

The information system that facilitates the knowledge cycle from acquisition, sharing and application to improve organisational processes is a knowledge management system (KMS) (Wang, Wang & Yang, 2016). KMSs are key to facilitating the knowledge creation, storage and usage process in large and small organisations, with the former receiving the bulk of attention (Gresty, 2013). Awa, Ukoha and Emecheta (2016) cautioned that the lack of IT diffusion among SMEs is a concern since it affects the development of national economies. In this regard, Dotsika and Patrick (2013) underline that implementing KM initiatives in SMEs may be even more crucial, as knowledge can be their single key resource.

The many factors that affect KMS adoption have been categorised into individual, organisational and system characteristics (Kaldi, Aghaie & Khoshalhan, 2008). Based on the level of adoption, either organisational or user adoption has been studied separately or as part of an integrated model. Kaldi, Aghaie and Khoshalhan (2008) proposed a non-empirical organisational model based on various pressures (mimetic, coercive and normative), environmental factors, and organisational and KMS characteristics. They also propose a KMS acceptance (individual-level) model based on the TAM of Davis (1986) that integrates individual, organisational and KMS characteristics. This study follows a similar strategy by combining individual, organisational and environmental factors.

Lin (2013) investigated KMS adoption factors in large Taiwanese organisations and tested three factors influencing KMS adoption and continuance intention: organisational readiness, expected benefits and organisational learning capability. Organisational readiness consists of five dimensions: top management involvement (top management support in TOE), technological resources, training resources, project management resources and organisational fit. Even though Lin's study captured some of the TOE dimensions, it was conceptualised somewhat differently.

The results nonetheless indicate that all three hypotheses are significant (to various degrees). Organisational readiness and expected benefits are significant at $p < 0.001$. Lin

(2013: 400) concluded that “consistent with expectations, organizational readiness considerations are more important for potential adopters as indicated by the fact that without the proper preparation of resources, the adoption of any KM initiatives is bound to fail”.

Drawing on Diffusion of Innovation theory, Tsai and Hung (2016) investigated the determinants of KMS adoption (see Figure 3.4) within a healthcare context to develop an integrated model. Three dimensions were used, namely organisational characteristics, KM enablers and KMS characteristics. Findings indicated that, at least for KMSs in a healthcare context organisational characteristics and KM enablers where more important than the KMS characteristics. In line with Lin (2013), the authors also found top management support and IT infrastructure significant. The only insignificant findings was complexity of KMS. This findings contradicts the majority of other models of IT/KMS adoption. Nonetheless, when superimposing the KM literature and CSFs with this model, the emerging most significant factors were senior management support, IT infrastructure and complexity of KMS.

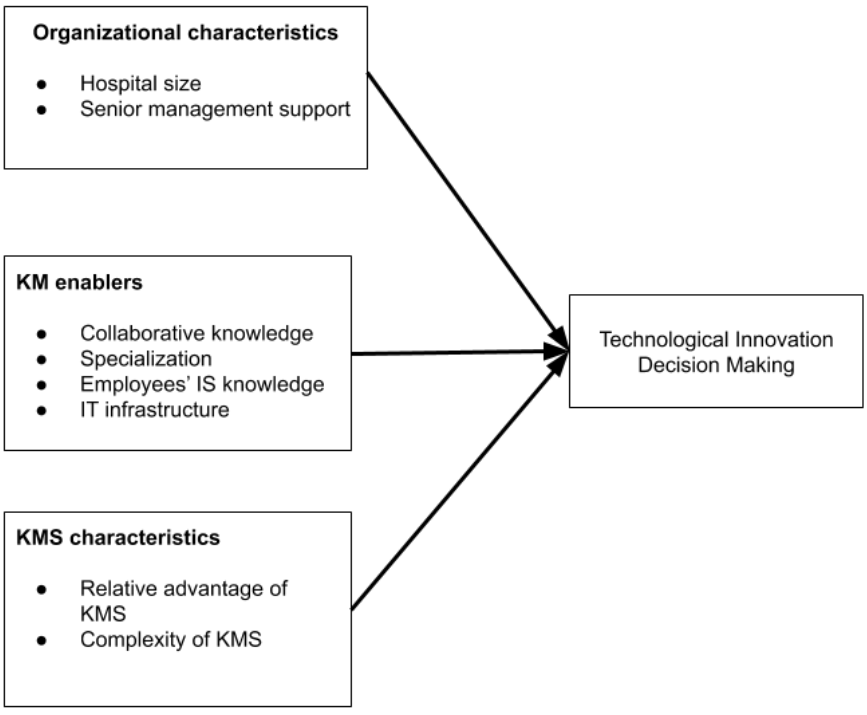

Figure 3.4: Knowledge management system adoption model (Source: Tsai & Hung, 2016)

Kamprom, Lertworaprachya and Lertwongsatien (2018) conducted a systematic literature review of KMS adoption models at the individual level by detailing the studies that successfully applied individual-level models (e.g., TPB, TAM and UTAUT) to KMS use. The authors suggested that in future research, depending on the complexity of the technology, a combination of models may be required to comprehend IT adoption better.

On the other hand, Rai and Bajwa (1997) proposed a context-specific IS adoption model by surveying 1423 executives in large organisations. The focus of the context was on executive ISs (EIS). The authors indicated top management support as a critical factor in EIS adoption. As mentioned before, some KMS models were developed to fit a country-specific context, such as Saudi Arabia (Alatawi et al., 2012), Ghana (Dei, 2017), China (Lee et al., 2009) and Mexico (Tamez, 2014). Xu and Quddus (2005) investigated KMS adoption factors for Australian organisations. They conducted a national survey based on 1500 large organisations. Research findings indicated that the most prevalent KMS included e-mail, internet access, databases and an intranet. Other studies on KMSs emphasise different dependent variables and can thus not be compared directly. However, many researchers have used KMS success and KMS diffusion as dependent variables (Hung, Huang, Lin & Ling-Tsai, 2005; Xu & Quaddus, 2012).

Although various factors contribute to KMS adoption, authors have found some factors to consistently contribute to KMS success. For example, as will be indicated below, the role of top management support is highly prevalent in both individual-level and organisational-level models (Azyabi, 2019; Wang & Lai, 2014; Hung, Huang, Lin & Tsai, 2005; Quaddus & Xu, 2005; Xu & Quaddus, 2007; Al-Busaidi & Olfman, 2005). Other factors that were included in multiple models were organisational culture (Quaddus & Xu, 2005; Hung, Huang, Lin & Tsai, 2005), organisational learning (Shrafat, 2018; Lin, 2013) and IT infrastructure (Al-Busaidi & Olfman, 2005; Shrafat, 2018). Next, it is important to investigate KMS from a South African perspective.

3.8.2. Knowledge Management Systems: A South African perspective

Limited research exists on KMS adoption in a South African context. Moreover, research has often been conducted in larger organisations such as banks and municipalities

(Ndaba, 2018). A recent systematic literature review of KM in SMEs containing 89 papers published in peer-reviewed journals on KM covered only one study from South Africa (Massaro *et al*., 2016). Maramba, Coleman and Ntawanga (2020) identified multi-context challenges in KMS implementation in the SA healthcare industry. Leadership, organisational, human resource management, technology, and KM process activities were found to be the most critical factors.

Given these multiple factors, a holistic approach to knowledge management is warranted. “It is clear that the solutions have to be a mix of cultural, organizational, process, management and technology initiatives” (Du Plessis, 2007: 92). Generic factors include top management support as leaders need to share a vision of KM and provide sustained support for the program. In addition, rewards and incentives create a co-operative and innovative culture.
The following sections discuss critical success factors in the context of knowledge management.

3.8.3. Critical success factors of knowledge management

The term ‘critical success factor (CSF)’ was introduced in the 1960s to create a new perspective on competition and performance goals (Ram & Corkindale, 2014). CSFs are defined as things that must go right in an organisation for it to compete successfully and hence for the organisation to flourish (Rockart, 1979). As discussed, KM should become essential to SMEs' survival efforts. Part of these efforts should consider CSF (Rao, Nandini & Zachariah, 2022). Such a perspective provides further credibility to factors influencing KMS adoption in SMEs.

Significant overlap exists in the identified CSFs for those factors identified in the KM field, indicating agreement within the literature. Some of the most prevalent factors in the findings include organisational culture, top management support, training, leadership, rewards, motivational aids, strategy, and IT infrastructure. As Rockart (1979: 12), who further described and identified CSFs, asserted:

"the CSFs concept promised a systematic way of identifying the key areas, or signposts, that require constant and careful attention of management in order to achieve performance goals. CSFs are defined as 'the limited number of areas in which results, if they are satisfactory, will ensure competitive performance for the organisation".

To identify the CSFs for KM adoption in SMEs, Wong and Aspinwall (2005) validated eleven CSFs based on the literature and an SME survey. Their survey was possibly the first to determine CSFs in SMEs systematically. The factors were management leadership and support, (organisational) culture, strategy and purpose, resources, processes and activities, training and education, human resource management, information technology, motivational aids, and organisational infrastructure and measurement. Subsequent literature echoed their findings.

Since Rockart's (1979) research on critical success factors, CSFs have gained broader acceptance in the IS field (Saleh, Abdelrahman, Skoumpopolou & Wood-Harper, 2017, Ram & Corkindale, 2014; Sedighi & Zand, 2012; OuYang & Lee, 2010; Wong & Aspinwall, 2005). In particular, literature on enterprise resource planning (ERP) has received focused attention (Ifinedo, Rapp, Ifinedo & Sundberg, 2010; Ram & Corkindale, 2014; Skoumpopoulou & Moss, 2018).

Shaul and Tauber (2013) analysed many articles to identify CSFs. Their analysis revealed a total of 94 CSFs specifically related to ERP success. Scrutinising the CSFs for ERP, Ram and Corkindale (2014) identified 236 papers that referred to CSF for ERP. The authors sorted the CSFs into four categories: organisational, technological/ERP, project and individual-related CSFs. Even though CSFs might be slightly different in their definition from one study to the next, there is considerable overlap in the identified CSFs for knowledge management. Dei (2017) identified a comprehensive range of CSFs by applying a Delphi study. Some factors include culture, leadership, technology, and employee motivation. In the context of the proposed adapted TOE framework, the following common CSFs were found to be the most important in a KM context: technological (information technology/infrastructure (Sedighi & Zand, 2012; Wong & Aspinwall, 2005; OuYang, Yeh & Lee, 2010; Saleh et al., 2017) and organisational (top

management support (Sedighi & Zand, 2012; Wong & Aspinwall, 2005; OuYang, Yeh & Lee, 2010; Saleh et al., 2017; Lin, 2014).

Specifically reviewing the KMS literature systematically, OuYang, Yeh & Lee (2010) reviewed 42 articles between 1982 and 2009 applicable to KM research. Their four categories differed slightly from Ram and Corkindale's (2014). Sedighi and Zand (2012) divided the literature for KM implementation into eight mutually exclusive clusters with a total of 35 CSFs. An analysis of CSFs in Albanian organisations showed that leadership and support of top management were perceived to be the most important factors (Sensuse, Qodarsih, Lusa & Prima, 2018; Margilaj & Bello, 2015).

The failure perspective by Akhavan and Pezeshkan (2014) is novel. Whereas most studies emphasised critical success factors, this study involved 10 case studies from KM project failures. The cases weren't bound to a specific industry, and 27 factors were identified. The most prevalent failure factor among the ten cases was top management support, with 5 cases. Only two cases were reported containing an inefficient reward system. However, it should be noted that these findings are not meant to be generalised to a larger audience. Yet, the emphasis should be more on the identified factors than their prevalence. Where applicable, the CSF literature will be discussed for each factor forming part of the framework.

Four CSFs were proposed by Rao, Nandini and Zachariah (2022) and conceptualised as management leadership and support, measurement, culture and strategy (which included IT and human resource management (HRM). HRM, for example, includes motivation and rewards and training, while KM processes and techniques are part of the culture. This categorisation complicates the comparison of other CSFs with the CSF literature. Nonetheless, the authors' CSFs showed considerable overlap with the CSF from other studies mentioned above.

3.8.4. Criticism of critical success factors

Simply by definition, any critical success factor is valuable to the organisation and can be identified to apply to KMSs, significantly improving adoption. However, several studies

have criticised the current literature for providing different sets of CSFs (Ngai, Law & Wat, 2008). In conclusion on previous findings, Ram and Corkindale (2014) stated that there is disagreement on the nature of CSFs due to various past methods and measures to determine CSFs. Literature on what constitutes a CSF is missing theoretical underpinning, and definitions are inconsistent with what constitutes a CSF (Saleh, Abdelrahman, Skoumpopolou & Wood-Harper, 2017). Furthermore, identifying a CSF does not specify its implications (King and Burgess, 2006). A study by Ram and Corkindale (2014) indicated that some CSFs in the ERP literature were not empirically verified but based on manager opinions.

For this reason, the authors cautioned against optimism in employing CSFs and hoping for project success. In addition, various studies have identified different CSFs leading to disagreement as to what actually constitutes a CSF (Ngai, Law & Wat, 2008). The CSFs of KM strategy underly the shared vision and achieving shared objectives set by leaders (Sedighi & Zand, 2012).

Certain precautions were taken to improve CSF credibility in light of the caution that CSFs should be discussed and handled with care.

- Only CSFs that appear as constructs in various technology adoption models were accepted, depending on the context.
- Only CSFs that appear recurrently in systematic literature reviews and CSFs that have been empirically verified were discussed.
- Finney and Corbett (2007) suggested that the CSF approach can be approved only after a thorough consultation with stakeholders.
- Relevant CSFs were discussed under the respective identified KMS adoption factors.

3.9. Successes and failures of information technology projects

All organisations must incorporate technological innovation in a dynamic economy to compete in the global marketplace (Ramona & Alexandra, 2019). Over the last 40 years, IT and information system (IS) implementation failure has remained high despite

advances in human-computer interaction and many studies attempting to improve implementation success. Change management efforts in organisations tend to suffer from a poor track record; thus, IT systems' failure rate has increased rapidly (Gunawardhana & Perera, 2015). Up to 75 percent of change management projects do not achieve their intended goals and thus fail (Decker & Clear, 2012; Wheatley, 2006). The 2020 CHAOS report by the Standish Group estimates the failure rate of software projects to be close to two-thirds of all projects (Domingues, 2021). A study by the research organisation Gartner showed that 70% of Customer Relationship Management (CRM) projects result in a partial loss or no improvement in organisational bottom-line performance (Foss, Stone & Ekinci, 2008) and that 85% of big data projects fail (Asay, 2017). Marnewick, Erasmus and Joseph (2017) asserted that only 40% of IS projects achieve strategic benefits for their organisation. In South Africa, the picture is even less rosy. On average, IT projects in South Africa fail at 28% (Marnewick, Erasmus & Joseph, 2017). In other words, more than 70% of projects add little to no value to the organisation. With IT spending in South Africa totalling R303.46 billion in 2018 (Moyo, 2018), this equates to a substantial loss for organisations in terms of time and resources.

Against the backdrop of the generally poor IS success rate, Dwivedi et al. (2015) posed the following question “Why do some companies succeed and some fail?” IS success research is among the most well-studied research in the field. Various factors relating to task, structure, people and technology have been found to contribute to failure. However, large organisations are not immune to IT failure. For example, a SAP ERP software implementation by Levi Strauss lead to a 20-fold cost overrun. At the same time, a Schengen Information System (SIS) was delivered six years late after an eight-fold increase in budget (Morcov, Pintelon & Kusters, 2020). For SMEs with less access to recourses in the event of failure, the risk of failure is significantly larger, with severe consequences. Other consequences of IS failures include declining market value, disputes around responsibility for financial losses (Dwiveldi et al., 2015), increased sick leave and increased staff turnover (Laumer, Maier, Weitzel & Eckhardt, 2012). Not only does IS adoption failure lead to financial losses, but the KMS also needs to be adapted or a new system adopted for implementation, adding further costs and resources (e.g., time) to the budget. In addition, technological and organisational issues are often outside

the project team's control, increasing the complexity of the IS project (Marnewick, Erasmus & Joseph, 2017).

In contrast, the successful adoption and implementation of a KMS may contribute substantially to the success of the organisation. It is especially true for SMEs who can acquire knowledge relatively economically compared to other competitive advantages (e.g., assets, capital reserves and unique locations (Jooste, Strydom, Berndt & du Plessis, 2012). Also, the positive role of knowledge in the current knowledge economy should enable SMEs to compete more efficiently with large organisations. However, the study believes that knowledge creation, storage and transfer can only happen with the successful adoption of a KMS. Moreover, as discussed above, the accelerated pace of information generation and technological advancement is crucial to remain competitive as an organisation.

Now that the rationale for the framework has been established and the relevant literature reviewed, the contexts (and their related factors) which will form part of the preliminary theoretical framework will be discussed.

3.10. Human behavioural context

It is clear from the literature above that the perception a person has of how easy a task is to complete or the belief a person has of their ability to complete a task successfully has a major impact on adoption. The aforementioned behavioural models made use of related concepts as an indicator, such as perceived behavioural control (PBC) (Ajzen, 2002), perceived ease of use (Davis, 1989), effort expectancy and computer self-efficacy (Venkatesh et al., 2003). Nonetheless, construct within the TOE have neglected the inclusion of behavioural constructs, such as self-efficacy and rewards.

While the TOE framework aligns with a holistic view in complexity theory by including contexts on various levels of adoption, there is a lack of emphasis on the human behavioural context in technology adoption. Studies on technology adoption factors tend to emphasise the broader environmental context, a more general organisational context, and a level explicitly pertaining to the technology itself as part of the technological context.

Ultimately, the usage and contribution to the KMS reside with the individual user. Without input from the individual user, contribution, storage, and knowledge transfer into the KMS will either not occur or will be impeded. Two individual behavioural constructs will now be discussed: self-efficacy and motivational aids and rewards. The first concept, self-efficacy, relates to task competence.

3.10.1. Self-efficacy

As has been demonstrated in the organisational psychology literature, there is a universal need for people to feel competent in their actions (Compeau & Higgins, 1995; Deci & Ryan, 2000; Venkatesh, 2000; Haryanti, Margianti, Prihantoro & Ohorella, 2021). Social cognitive theory (SCT), a theory of behavioural change developed by Bandura (1977), aims to explain personal conduct within social systems, including the adoption of information systems (Middleton, Hall & Raeside, 2018). According to Choi, Nam, Kim, Jung and Lee (2020), self-efficacy refers to "one's self-evaluation of the ability or value to perform a specific task" and is a vital motivational factor, in this case for KMS adoption. As such, it emphasises judgements about a person's future behaviour rather than past behaviour (John, 2013).

Bandura's (1986) social cognitive theory proposed that the effect of self-efficacy has several consequences. Firstly, self-efficacy will affect a person's effort exerted when confronted with obstacles and persistence to overcome them. Self-efficacy will influence a person's level of stress and anxiety. Secondly, self-efficacy predicts a person's performance and coping behaviour. And finally, it influences the context and actions that affect a person's behaviour choice. As a result, an employee with high KMS self-efficacy is more eager to conquer the obstacles caused by technology and adopt a positive attitude towards technology (Tan, Ramayah & Popa, 2017).

Numerous studies have been published over the years on KM behaviour and the positive effect self-efficacy has on sharing knowledge and engaging with the activity (Safdar & Mahmood, 2021; Chen, Chuang & Chen, 2012). Other factors which have also been shown to increase an employee's self-efficacy towards greater KMS adoption include perceived benefits, training, orientation programs and learning (Ozlen & Handzic, 2017).

Behaviour and technology adoption models (Polites & Krahanna, 2012; Brown, Venkatesh & Hoehle, 2015) are both constructs of which self-efficacy is a constituent. The role of self-efficacy in technology adoption is important. It is not only about the benefits derived from the technology itself but also ensuring that users have the necessary belief in their skills to successfully accomplish future tasks (Compeau, Higgins & Huff, 1999).

Developments after the conceptualisation of self-efficacy in psychology gave rise to positive psychology, which is defined as an umbrella term for the study of positive emotions, positive character traits, and enabling institutions" (Miller, 2008; Seligman, Steen, Park, & Peterson, 2005, p: 410).

Behavioural components, including self-efficacy, have, in many shapes and forms, been a part of technology adoption models starting with the TAM (e.g., Compeau, Higgins & Huff, 1999; Wang & Lai, 2014). Davis (1986) opted to include a similar construct: perceived ease of use (PEOU) instead of self-efficacy. In particular, the TAM includes a variety of theoretical views, including self-efficacy and Vroom's (1964) expectancy theory (Money & Turner, 2004), although not explicitly incorporating the concept of self-efficacy.

The acquisition of self-efficacy is not a general belief in a person's ability to carry out a specific behaviour but is rather a specific acquired domain (Davis, 1989; Polites & Karahanna, 2012). In line with this thinking, nuanced conceptualisations of self-efficacy have further been developed, including computer self-efficacy (Venkatesh, 2000; Lai, 2009; John, 2013; Ariff, Yeow, Zakuan, Jusoh & Bahari, 2012; Agarwal & Karahanna, 2000); knowledge self-efficacy (Lin, 2011); self-efficacy for change (Kim & Kankanhalli, 2009) and internet self-efficacy (Eastin & LaRose, 2000). Thus, various empirical studies indicated that self-efficacy successfully influences the use of IT.

Other studies have also displayed the positive effect of self-efficacy on IT use (Lewis, Agarwal & Sambamurthy, 2003). In particular, Lai (2009) investigated the role of computer self-efficacy and illustrated how it affected KMS success at high-tech companies. The findings indicated that computer self-efficacy affects user satisfaction and KMS usage

intention through mediating variables, specifically in high-tech organisations. Finally, Kulviwat, Bruner and Neelankavil (2014) investigated self-efficacy as an external variable to a cognitive-affective version of the TAM. Their findings substantially increased the variance of technology adoption by including self-efficacy.

A particular form of IS self-efficacy relevant to this study is knowledge management system self-efficacy (KMS self-efficacy). KMS self-efficacy "affects individual behaviour by influencing the individual's beliefs, attitude, and self-confidence in the face of obstacles in KMS-related tasks" (Chen, Chuang & Chen, 2012: 107). In some technology adoption models, self-efficacy has either a moderating role through perceived ease of use (Venkatesh & Davis, 1994; Venkatesh et al., 2003; Venkatesh, Brown, Maruping & Bala, 2008; Lai, 2009) or direct effect (Wang & Lai, 2014; Coakes, Amar & Granados, 2013) on the dependent variable. However, as far as the author is aware, the role of KMS self-efficacy in a TOE framework has not been established.

Results analysed by Hasan (2006) indicated that system-specific self-efficacy (e.g., in KMSs) reflects a stronger predictor of behavioural intentions and attitudes (and PU) than general computer self-efficacy. Furthermore, web-specific self-efficacy positively influences intention and usage (Hsu & Chiu, 2004). Yet, reuse intention was not significant in a KMS adoption context, although KMS self-efficacy has been found to significantly influence KMS usage (Lin & Huang, 2008). Chen, Chuang and Chen (2012) found that interest and willingness to future use are influenced by system-specific self-efficacy. A person with self-efficacy towards KMSs is more likely to share information and knowledge. From the outset, employees with KMS self-efficacy show a greater eagerness to learn the KMS functions, which positively influences the employees' KMS usage intention (Kuo, Lai & Lee, 2011).

KMS self-efficacy has important implications for the organisation's employees. Firstly, KMS self-efficacy is critical in shaping a user's beliefs, attitudes, and self-confidence, influencing KMS adoption (Chen, Chuang & Chen, 2012; Ozlen & Handzic, 2014). Furthermore, Wang and Lai (2014) argue that KMS self-efficacy influences user actions in the form of motivations and behaviour regarding IT. However, their study indicated that

KMS self-efficacy had an insignificant effect on an employee's intention to reuse the KMS, which contradicted previous studies.

In summary, four important observations came to light. Firstly, the belief in a technology user's ability to successfully complete tasks has been recognised as an important factor in technology adoption. Secondly, self-efficacy can act as a mediating or moderating variable, depending on the context affecting technology adoption. Since the study aims to explore factors influencing KMS adoption, such an investigation is beyond the scope of this study. Thirdly, self-efficacy and its related concepts play a critical role in IS adoption, including in KMS. Lastly, a behavioural context related to competence is lacking in the TOE framework; therefore, self-efficacy can contribute to expanding constructs as part of the TOE. Based on the discussion, the following proposition is put forward.

Proposition 1: KMS self-efficacy behaviour advances KMS adoption behaviour of employees in SMEs

3.10.2. Motivational aids and Rewards

People can believe in their capabilities to accomplish a task without the necessary motivation. For instance, a person can believe that their KM skills are sufficient to use the KMS or that they can use a new software application. However, it is possible that the person is still not motivated to adopt the KMS or use the new software program for various reasons. Similarly, employees can experience self-efficacious behaviour to adopt a technology (John, 2013; Al-Haderi, 2013; Peng, Sung & Guo, 2018), but the motivation to adopt the technology is lacking due to a lack of incentive. Sapta and Syaputra (2017) suggested that incentives can improve students' self-efficacy in a classroom setting.

Motivational aids are required to create a knowledge-sharing culture in the organisation for successful KMS adoption (Cagnazzo, Tiacci & Rossi, 2014). The purpose of rewards for employees should be designed to adopt, share and support the KMS. However, as Gal and Hadas (2015: 968) stated, "the average organizational reward system causes a

knowledge worker to reject almost all project management initiatives, which is one of the reasons that a significant proportion of many projects fail".

A KMS without employees motivated to share knowledge would add very little value, if any, to an organisation's knowledge base. Even with superior technology and the richest information database, the success or failure of a KMS often hinges on employees' motivation (Malhotra, 2003). As Ajmal, Helo and Kekăle (2010) highlight in their study on critical factors in KM projects, a lack of incentives was the most salient factor for successful KM projects.

Rewards act as mechanisms through which KMS users can contribute knowledge resources (i.e., time and effort) to the KMS. Rewards from management are needed to improve skills and employee eagerness (Chang, Hsu & Yen, 2012). How rewards are structured in the organisation is crucial in KMS efforts due to employees' roles to create and codify knowledge for use by others. In addition, rewards encourage employees to create and codify their explicit knowledge (Al-Busaidi, Olfman, Ryan & Leroy, 2010). As a result, motivated employees are more likely to contribute to knowledge sharing in the organisation (Saleh, Mahmoud, Skoumpopoulou & Wood-Harper, 2017). In contrast, Wong and Aspinwall (2005) found it unusual that motivational aids were not rated as a more important CSF by respondents. This observation is especially noteworthy when rewards are needed to encourage people to display behaviour oriented towards knowledge, such as seeking new knowledge and encouraging KM rewards in a supportive culture (Wong & Aspinwall, 2005; Saleh et al., 2017).

In a systematic literature review, extrinsic rewards have been cited as a CSF for KM (OuYang, Yeh & Lee, 2010). Furthermore, the use of a KMS tends to be based more on extrinsic rewards than intrinsic rewards (Wang & Lai, 2014). Thus, support can be provided by HR departments and managers as part of performance assessment through bonuses and incentives to employees for using the KMS (Lai, Ong, Yang & Tang, 2005; Nasseef, 2016).

For this study, incentives will refer to "influential people who provide reward systems for employees to encourage their usage of KMS" (Lai, 2009: 334). Therefore, both extrinsic

and intrinsic rewards encompass motivation. Rewards can be based on team, individual or both individual or team. Appropriate incentives are necessary to ensure knowledge sharing and contribution towards the KMS (Kuo & Lee, 2011; Kankanhalli, Tan & Wei, 2005). Results by Vitari, Moro, Ravarini and Bourdon (2009) indicate that organisational-level initiatives, such as a suitable incentive system, can dramatically increase KMS contributions and, hence, KMS adoption success. These actions should be driven by top management to promote a knowledge-sharing culture. It is the employees' role to create and codify knowledge for use by others as well as create and codify their own explicit knowledge. This conduct should also come from management to promote a knowledge-sharing culture (Al-Busaidi, Olfman, Ryan & Leroy, 2010).

The need for motivation in KM efforts has been consistently demonstrated (Sensuse et al., 2018; Wang & Hou, 2015; Sajeva, 2014). Ajmal, Helo & Kekäle (2010:164) highlight that

"*it is apparent…that a lack of incentives and the absence of an appropriate system were perceived to be the most significant barriers for successful KM initiatives in projects*".

However, the role of incentives in KMS adoption has rarely been studied, especially in SMEs who, as previously cited, are the lifeblood of large organisations. By definition, incentives and motivators of behaviour are those factors that drive people to make a specific choice rather than another.

Durinik (2015) suggested gamification as a way for employees to adopt KMSs. These strategies include, but are not limited to, increasing a person's self-efficacy and including tangible rewards (e.g., gift cards or business trips). Self-efficacy, the author argues, is crucial for influencing a person's motivation for adopting KMSs.

Two broad motivational systems exist, which categorise Rewards as extrinsic (monetary bonus payments) and intrinsic (non-monetary, such as recognition and reciprocity) (Wang & Lai, 2014) for participating in KM endeavours (Nordin, Arshad & Kalid, 2016). Self-efficacy is an intrinsic motivational characteristic (Nordin, Arshad & Kalid, 2016).

Classic theories regarding motivation are expectancy theory and reinforcement theory. Expectancy theory is associated more with extrinsic rewards than internal ones and works on the assumption that people's behaviour can be linked to specific outcomes (Lai, 2009). For example, if a manager links financial incentives to performance, the expectation is that extrinsic motivation may increase effort and performance (Vroom, 1964). Reinforcement theory state that organisms tend to repeat actions when these actions are followed by positive consequences (Weiten, 2014).

While both theories emphasise extrinsic motivation, the role of intrinsic rewards and motivation, such as mastery, purpose and autonomy, cannot be neglected (Pink, 2009). Ajmal, Helo and Kekäle (2010) found six barriers to motivation in their study aimed at identifying barriers to KM initiatives. Of these, incentives and the lack of an appropriate reward system carried the highest weighted average. In line with findings suggesting top management support, the authors suggested that top management should implement incentive schemes to improve KM success.
Constructive feedback that boosts self-efficacy would be more appropriate for motivating employees. Both types of motivation have value in the IS literature. It is one of the most prevalent factors in KM research and, as such, has been identified as a key factor in IS adoption behaviour (Hung, Durcikova, Lai & Lin, 2011) and CSF literature reviews by Rao, Nandini and Zacharia (2022) and Sensuse et al., (2018). Based on the literature presented relating to motivation in KMS adoption, the following proposition has emerged:

Proposition 2: Motivational aids and rewards advance KMS adoption behaviour of employees in SMEs

3.11. Technological context

Information technology is an integral element of KM (Matayong & Mahomood, 2011), even more so with ever-increasing worldwide year-on-year spending (Sava, 2022). The technology context refers to all the technologies internal to the organisation and the external technologies currently available (Tornatzky & Fleischer, 1990; Wang & Wang, 2016). Existing innovations create demarcations of possible technologies that enable

organisational evolution and adaptation (Baker, 2011). Perhaps appropriately, the technological context is considered a separate element in the organisation since the nature of the technology itself can influence adoption.

The consistency between the TOE and DOI has been echoed by several researchers in the past (Tom & Wan, 2019; Adam, Blewett & Wasserman, 2015; Wang, Wang & Yang, 2010). The three technology factors found to be most prevalent are relative advantage, compatibility and complexity, all from the DOI. Therefore, all three factors were discussed as part of the proposed framework for this study.

The introduction of this chapter gave an overview of the radical technological shifts occurring at this moment as a result of innovations as part of the Fourth Industrial Revolution, the Internet of Things, and crowdsourcing, among others. This significant shift has already brought major changes to corporate and social life. With the knowledge economy bringing about unprecedented challenges, particularly for SMEs (Wang & Yang, 2016), knowledge management were a noticeable factor in driving demand for IT (Nazarizade and Azizi, 2018). From the perspective of KM as providing access to information, the role of IT should be to provide appropriate search and retrieval methods to locate relevant information (Alavi & Leidner, 2001). According to Wong and Aspinwall (2005), it is indisputable that one of the key enablers for implementing KM is IT. IT adds greater depth and breadth to organisational knowledge processes (Alavi & Leidner, 2001). At the same time, a key question debated in the literature is whether IT can be detrimental to knowledge creation. Information technology should be seen as a medium that allows knowledge transport. It should neither be a proxy for knowledge nor be expected to generate knowledge on its own (Chua, 2004; Halawi, McCarthy and Aronson, 2017; Xu & Quaddus, 2012).

The constructs of the technology context as part of the TOE framework are often attributed to the diffusion of innovation (DOI) theory of Roger (1995). Hoti (2015) conducted a systematic literature review on the TOE framework for IS adoption in SMEs. The technology factors most often used are relative advantage, compatibility and complexity (Hoti, 2015). In a South African context, Ndaba (2018) included these three

factors to study KMS adoption. However, relative advantage and compatibility were only partially supported as contributing factors to KMS adoption (Ndaba, 2018).

KMS's success depends on the extent of use. It has the benefit of playing a variety of roles. By leveraging various IT capabilities, KMS can support other KM processes over and above simple storage and retrieval of knowledge. In a case study setup, Yeh, Lai and Ho (2006) found that IT is an enabler of KM in organisations along with leadership, people, strategy, and corporate culture. Improvements in the usability of IT design have contributed to the increased market size with the emergence of the technological revolution. Thus, with the knowledge creation mainly in electronic format (databases, e-mails and web applications), it is conceivable that IT infrastructure is a vital backbone for KMS adoption.

3.11.1. Factor 1: Relative advantage

Relative advantage is the degree to which an innovation is perceived as providing greater benefits to the organisation than the idea that superseded it. The greater the benefit for the organisation, the more likely KMS adoption would be (Rogers, 1995; Okour, Chong, Fattah, 2020). Relative advantage is seen as one of the most highly ranked parts of the technological context (Atan & Mahmood, 2022). KMS could allow an organisation to manage available knowledge and acquire knowledge it does not have.

In a cloud computing context, relative advantage has been rejected in a past study (Alhammadi, Stanier & Eardley, 2015). However, the authors noted that their findings starkly contrasted with previous findings that relative advantage influences cloud computing. Previous studies have found significant relationships between relative advantage and cloud computing (Amini & Bakri, 2015). With many organisations using cloud-based technologies for their KM, these findings are relevant to KMS adoption. SMEs are part of a large group of organisations that attract benefits from cloud computing (Amini & Bakri, 2015). With only a few exceptions, all the studies systematically reviewed which utilised the DOI theory, indicated relative advantage as an antecedent (Kapoor, Dwivedi & Williams, 2014). In practice, this means that an efficient change management process will be required, and, in addition, the relative benefits of the KMS need to be

communicated and demonstrated (Ndaba, 2018). Therefore, the following proposition emerges:

Proposition 3: Relative advantage advances KMS adoption behaviour of employees in SMEs

3.11.2. Factor 2: Compatibility

Rogers (2003) defines compatibility as the degree to which the innovation fits into the organisation's existing values, previous practices, and current needs. The higher the compatibility, the higher the likelihood of innovation adoption (Pool, Arabzad & Ansari, 2015). Compatibility is essential for innovation adoption (Amini & Bakri, 2015). When an organisation adopts a technology incompatible with its current values, needs and practices, major modifications to current practices are required, which could involve substantial learning. Findings indicated that compatibility significantly influences KMS adoption in organisations (Wang & Wang, 2016). Other studies that analysed IS adoption in SMEs have found compatibility to be significant (Safari, Safari, Hasanzadeh & Ghatari, 2017; Ifinedo, 2011; Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011). A failed alignment of a new KMS with existing needs and values can have significant financial implications for SMEs unrivalled by large organisations. So, in an organisational context, managers must ensure the compatibility of new applications with existing infrastructure. Furthermore, the implemented system needs to be aligned with the goals, practices and norms of the organisation (Ndaba, 2018). Therefore, the following proposition emerges:

Proposition 4: Compatibility advances KMS adoption behaviour of employees in SMEs

3.11.3. Factor 3: Knowledge management system complexity

Change in organisations involves many employees, departments, processes and systems, specifically when it involves a novel IT innovation. Complexity refers to the extent to which a technology is perceived as being difficult to understand and use (Rogers, 1983). It can be seen as the opposite of the construct 'perceived ease of use' used by Davis (1989) in the TAM (Huang, & Lai, 2014). The more complex a KMS is, the

less likely it is to be adopted. Consistent with complexity theory as this study's theoretical paradigm, a KMS has an interrelationship and interconnectedness with other systems in an organisation (Wang & Wang, 2016). The introduction of a new IS may lead to SMEs having to change their interaction with other organisational systems (Alshamaila, Papagiannidis & Li, 2012).

Furthermore, adopting a new technology may challenge SMEs in changing the processes through which they interact with other business systems. Managers can reduce complexity by making the KMS user-friendly through thorough training and support (Ndaba, 2018). The aeroplane accident involving Ethiopian Air is a prime example. By redesigning the engines of the Boeing 737 MAX 8, an additional 14% increase in fuel efficiency was achieved. Unfortunately, the redesign consequently made the aeroplane susceptible to a stall. Thus, it required the installation of an additional complex on-board system to ensure that, under certain conditions, stalling would be impossible. However, the malfunctioning of the system behaved opposite to its intended effect, leading to a total loss of life (Ostrower, 2018). Complexity was found to have an insignificant effect in one of the studies reviewed by Hoti (2015); however, other studies found complexity to be a significant contributing factor in the technology adoption literature. In a KMS adoption context, complexity was found to be highly significant ($p < 0.001$) (Okour, Chong & Fattah, 2020). Within a complexity paradigm, complexity is a valuable construct for this study and will be conceptualised as KMS complexity. Therefore, the impact of complexity cannot be ignored (Tarhini, Arachilage & Abbasi, 2015). Given the role of complexity in technology adoption, the following proposition emerged:

Proposition 5: KMS complexity of technology advances KMS adoption behaviour of employees in SMEs.

3.11.4. Organisational context

The organisational context refers to available resources in the organisation's possession for the adoption of innovation, including formal and informal structures, communication processes and the organisational size (Tornatzky & Fleischer, 1990; Lippert & Govindarajulu, 2006).

3.11.5. Top management support

Lin (2011: 140) defined top management support (TMS) as “the degree to which top management understands the importance of KM and the extent to which top management is involved in KM practices”. The importance of TMS has long been identified as a relevant construct in the IS literature. For example, in their citation review about top management support, Rai and Bajwa (1997) identified some early citations from 1963-1990 as relevant to their model.

Whereas self-efficacy represents the internal control over adopting new technology, TMS reflects the external control over adoption (Ajzen, 2002). However, both are important in adopting technology (Al-Haderi, Rahim & Bamaharos, 2018). Organisational factors include satisfaction with existing systems, technology policy, TMS, technical competence, organisational scope, financial resources and IT infrastructure complexity (Wang & Wang, 2016).

Azyabi and Alhazmi (2019) investigated KM diffusion (adoption and implementation) in Saudi Arabian SMEs. Using the TOE framework, they found that only IT support, IT effectiveness and reward were significant. On the other hand, top management, sharing knowledge and competition was found to be insignificant, though no explanations were offered.

Since implementing KM in an organisation requires the devotion of resources (such as employee time and financial resources), management requires good justification to substantiate the costs and benefits accompanying KM (Al Ahbabi, Singh, Balasubramanian & Guar, 2018). Top management sets out a path of clarity regarding constraints for employees in how technology can be utilised (Lewis, Agarwal & Sambamurthy, 2003). Management support ensures the necessary resources and tools for people, including hardware and software access and creates a favourable environment acting as change agents for IS success. In addition, management should ensure a sufficient budget and materials for skills training and encourage employees to adopt the IS (Al-Mamary, Shamsuddin & Aziati, 2014).

Top management support is seen as a critical factor for information system (IS) project success by Bueno and Gallego (2017) and has been identified in virtually all CSF reviews relating to KM (Saleh et al., 2017; Sensuse et at., 2018; Rao, Sandini & Zachariah, 2022). Thus, evidence points towards the significance of TMS in adopting IS. Furthermore, when the TOE framework and DOI theory are combined, TMS affects IT adoption in different contexts (Wang, Wang and Yang, 2010; Li, 2008). In particular, Shrafat (2018) cite two studies that emphasise that the two most salient factors in KMS adoption are TMS and leadership.

KM practices can be more effective through an organisational climate of top management support when top management endeavours to enhance interaction between management and employees (Lin, 2011). For example, management can communicate to employees by sending messages detailing KM's importance. Top management can also support KM efforts through funding and resources for the necessary infrastructure (Xu & Quaddus, 2012). It is often seen as the most salient factor affecting IT adoption due to its ability to resolve difficulties and prioritise user needs, especially in the health IS sphere (Chen & Hsiao, 2012).

TMS is a pervasive construct in technology and KM adoption models. Wang and Wang (2016) showed that, as part of the TOE framework, TMS is highly significant in determining KMS implementation. Complementary to a KMS implementation is the necessary change of organisational philosophy about knowledge activities. Therefore, organisations need to “reshape and redefine knowledge-related interactions among people and systems” (Wang & Wang, 2016: 835). Findings by Lin (2013) indicate that even organisations that do not have a KMS but are motivated to adopt a KMS require top management support, available resources and organisational fit of a KMS before KMS adoption is possible.

As a CSF, TMS was studied through case histories in which all the cases indicated that, compared to other CSFs considered (e.g., user involvement, project methodology, high-level planning and project staff), TMS is the most important factor for project management and IS success. Furthermore, other studies have also found TMS critical to KM efforts

(Wong & Aspinwall, 2005; OuYang, Yeh & Lee, 2010). Thus, the following proposition emerged:

Proposition 6: Top management support advances KMS adoption behaviour of employees in SMEs

3.11.6. Complexity leadership

Leadership is "the ability to translate vision into reality by influencing and motivating people within organizations" (Koohang & Paliszkiewicz, 2017: 522). In keeping with the complexity theoretical paradigm, this study is congruent with complexity in information systems and the complexity paradigm, including quantum leadership (Hall, 2010). Given complexity leadership being recently included as part of the quantum paradigm, complexity leadership has rarely been defined. In some studies on complexity leadership, clear definitions were lacking (Brewer, Flavell, Trede & Smith, 2016; Hall, 2010). Another definition that incorporates the idea of organisations as complex adaptive systems forming part of this study's quantum paradigm is a definition by Giles (2018). Giles defines complexity leadership as a set of six competencies that transform leaders and organizations to stimulate innovation based on solid research in neuroscience, quantum mechanics, social science and complex adaptive systems. These six competencies are self-management, creating safety, strengthening differentiation, providing connection, stimulating learning, and producing radical innovation. This study specifies complexity leadership as applying quantum mechanical principles (e.g., unpredictability and probability) to leadership.

An essential function of leaders is ensuring that information is converted to knowledge and accessible throughout the organisation (Storey & Barnett, 2000). Leaders also need to create a clear vision, goals, and objectives for the KM project that employees can buy into, creating a culture conducive to sharing knowledge and the creation and acquisition of knowledge (Sedighi & Zand, 2012; Nguyen & Mahomed, 2011).

Apart from the extrinsic motivation alluded to earlier, leadership is one of the most important approaches to motivating and convincing employees of their plans. Communicating their plans is even more important than incentives (Ali, Whiddett,

Tretiakov & Hunter, 2017: 42). As the authors put it: “leaders help the change process get going”.

Even so, it is suggested that leadership’s influence in KM processes is highly influential (Nguyen and Mohamed, 2011; Sadeghi & Rad, 2018). Furthermore, recent findings indicated that knowledge-based leadership and KM activities (including the acquisition, storage, transfer and application of knowledge activities) are essential (Donate & de Pablo, 2015; Sadeghi & Rad, 2018).

Given the necessary support by top management for KMS adoption to succeed, it is perhaps of little surprise that leadership features as a CSF in the systematic literature review of OuYang, Yeh and Lee (2010). Other authors have also included leadership as part of KM adoption and usage in organisations (Salehet al., 2017; Margilaj & Bello, 2015; Al-Mabrouk, 2006; Wong & Aspinwall, 2005; Badpa, Salim, Yahaya, & Kotamjani, 2018). Saleh et al. (2017) highlighted in their systematic literature review that leadership is one of the most important CSFs for KMS. Leadership is needed at all levels of the organization. It means that, regardless of size, SMEs require leadership just as much as large organisations (Koohang & Paliszkiewicz, 2017). In line with this argument, with a knowledge-friendly culture, Wong and Aspinwall (2005) emphasised the reciprocal relationship between top management support and leadership constructs.

Leadership in the Newtonian mechanistic paradigm functioned like a machine. Behaviour was seen as static, controllable, deterministic and inevitable with a fixed future destination. However, the ‘ability’ of this paradigm to adapt to and manage complex change fast is limited. In stark contrast with this paradigm, the quantum leadership paradigm is characterised by complexity, chaos and quantum mechanics. Complexity leadership aims to employ these concepts to transform organisational thinking (Hanine & Nita, 2019). It implies that leaders should let go of the need to know and control the future and endeavours relating to determinism and predictability. The uncertainty and unpredictability that accompany the quantum world tell that people change behaviour under observation because the world is naturally ambiguous (Papataya & Dulupcu, 2008; Curtin, 2011). In a Complex reality, leaders must be sensitive to developing quality relationships since each stakeholder is connected to every other as part of a larger

system. Leaders embracing the complexity paradigm embrace constructs of holism, celebrate adversity and spontaneity and are led by a clear vision and values (Zohar, 2022). Aligning with the complexity paradigm, leadership will be conceptualised as complexity leadership.

Thus, the following proposition emerged:

Proposition 7: Complexity leadership advances KMS adoption behaviour of employees in SMEs

3.12. Environmental context

The environmental context refers to the environment within which an organisation conducts its business. The environmental context includes its industry, competitors, and dealings with the government (Tornatzky and Fleischer 1990). The TOE compliments the DOI theory regarding such an environmental context (Atan & Mahmood, 2022).

Sometimes, an organisation may adopt a technology not because of the available technology of the organisation itself (Kaun & Chau, 2001). Rather, the adoption is influenced by the external environment. Factors that influence the external environment include the industry, regulatory environment, rivalry among competitors and technology service providers' competitive behaviour, governmental interaction and access to resources (Baker, 2011). Additional factors included as part of the external environment are market uncertainty, competitive intensity, industry pressure, government support and competition intensity (Wang & Wang, 2016). For example, competitive pressure for IS/KMS adoption can motivate an organisation to adopt a KMS faster (Lippert & Govindarajulu, 2006). In contrast, a lack of pressure from competitors leads to slower adoption, causing the organisation to be less capable of leveraging knowledge to better competitive performance.

Furthermore, the accelerated technological change could leave the organisation lagging in its industry and among its competitors. By including an environmental context, the

framework can better explain intra-organisational adoption (Hoti, 2015). Thus, including factors in the external environment is appropriate as part of environmental influences.

Despite the number of studies that utilise the TOE framework in various contexts and SMEs, only one study, as far as the author is aware, applies the TOE in the context of KMSs. Furthermore, no research investigating KMSs in SMEs using the TOE framework could be found. Expanding the KMS literature regarding the TOE framework in SMEs could be beneficial. The lack of KMS adoption has major implications for organisational effectiveness since a better comprehension of influencing factors will simultaneously improve adoption and reduce resistance (Lippert & Govindarajulu, 2006).

3.12.1. Competitive pressure

Competitive pressure refers to the degree to which the organisation's industry adopts an innovation (Bhattacharya & Wamba, 2015). It forms part of external environmental pressure and is initially defined by Iacovou et al. (1995: 470) as "influences from the organisational environment". The formulation of the concept originates from the work of Iacovou et al. (1995), who investigated inter-organisational system (IOS) adoption features in an EDI and has long been considered an important determinant of IT adoption (Amini & Bakri, 2015). In a KMS context, competitive pressure refers to the level of KMS capability of the organisation's industry and, most importantly, to that of its competitors. Competitive pressure has been included as part of the TOE in various contexts, including RFID (Wang, Wang & Yang, 2010).

The business environment is complex since each organisation interacts with subsystems within the organisation (e.g., teams and departments) and systems in its environment (e.g., competitors). As rivalry becomes fiercer among competitors, their need to increase competitive advantage through innovation will increase. Therefore, competitive pressure has been identified as an important determinant of KMS. (Wang & Wang, 2016).

In a South African context, Jere and Ngidi (2020) found the environmental context insignificant as a determinant of ICT adoption in SMEs, contradicting the findings by

Malak (2016). Despite this, competitive pressure was a significant factor in IT and KM adoption in previous studies (Jere & Ngidi, 2020; Wang & Wang, 2016).

The following proposition emerged from theorising the literature:

Proposition 8: Competitive pressure advances KMS adoption behaviour of employees in SMEs

To summarise the literature review of key factors influencing KMS adoption, Figure 3.5 below outlines the factors affecting KMS adoption in SMEs as part of a preliminary theoretical framework discussed in the literature

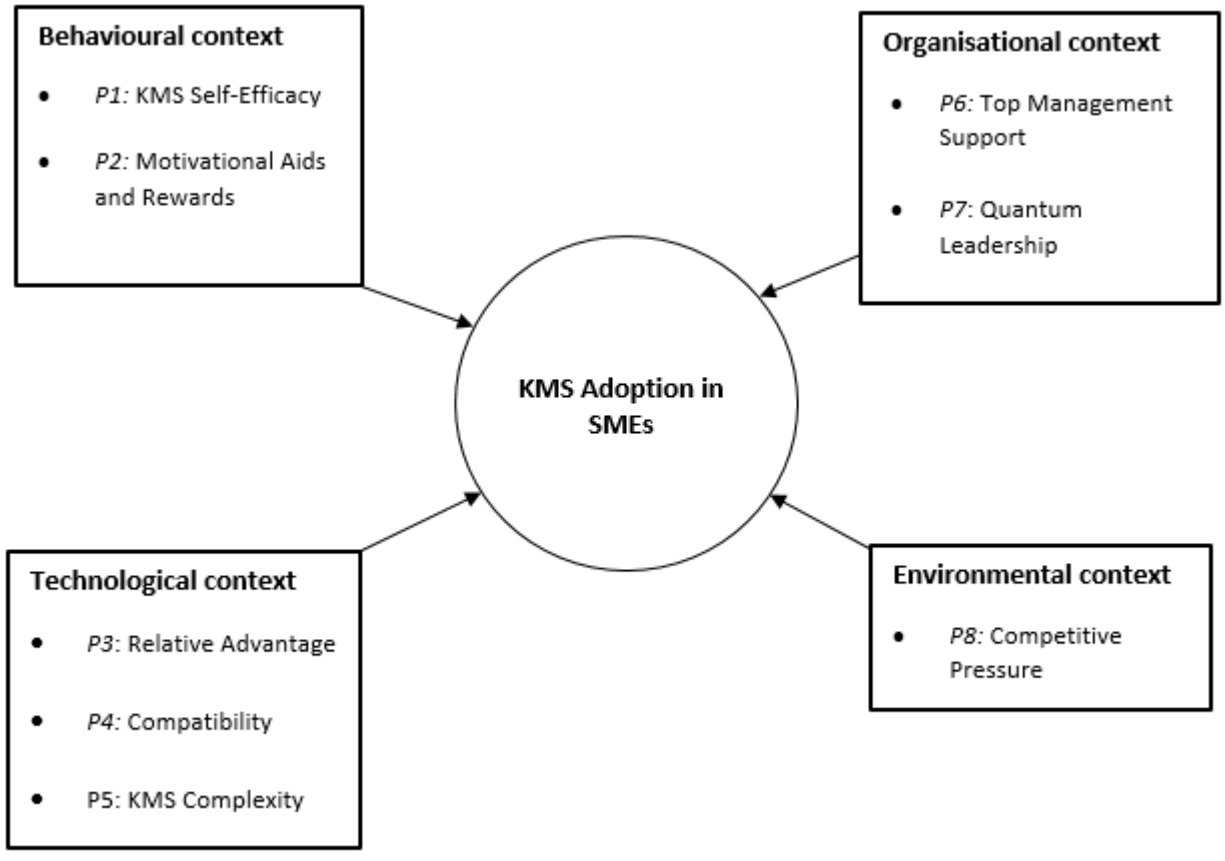

Figure 3.5: Preliminary conceptual framework of knowledge management system adoption in small- and medium enterprises (Source: Researcher's own)

It became clear that literature regarding the adoption factors of KMS in SMEs is still lacking (Zarilla, Ismail & Rosman, 2022; Centobelli et al., 2019; Shrafat, 2018), providing impetus for a study to explore the factors that influence KMS adoption in SMEs in South Africa. A review of the KM literature as it pertains to implementation, perception and transfer are relatively well researched, whereas research pertaining to the storate/retention and utilisation is relatively poorly understood. Given the value of SMEs to national economies, these gaps are worth investigating (Durst & Edvardsson, 2012), especially concerning the myriad of behaviours and pparoaches SMEs exhibit (Centobelli, Cerchione & Esposito). This context adds a unique contribution to the study and fits appropriately within the subsystems connecting to form larger, more complex, adaptive systems unique to complexity theory.

Chapter 4 will give a detailed description of the research methodology for this study.
Table 3. xxx below provides a summary of the classic and most contemporary theories and frameworks utilised as part of the development of the preliminary conceptual framework.

Table 3.6: Summary of key frameworks and theories used as part of the development of the preliminary conceptual framework

Concept	Proposes KMS Models	CSFs
TOE framework	Tornatzky and Fleischer (1990)	
Diffusion of Innovation	Rogers (1995, 2003)	
CSF	Ram, J. & Corkindale, D. (2014)	
KMS frameworks	Kaldi, Aghaie & Khoshalhan (2008); Shrafat (2018); Akhavan & Zahedi, 2014; OuYang, Yeh & Lee, 2010; Rao, Nandini & Zachariah, 2022; Saleh et al., 2017; Sensuse et al., 2018; Wong & Aspinwall, 2005.	
Top management support	Al-Busaidi & Olfman, 2005;; Lin, 2013; Tsai & Hung, 2016; Wang & Wang, 2016	

Concept	Proposes KMS Models	CSFs
Leadership	Dei, 2017; Al-Busaidi & Olfman, 2005	OuYang, Yeh & Lee, 2010; Rao, Nandini & Zachariah, 2022; Saleh et al., 2017; Sensuse et al., 2018; Wong & Aspinwall, 2005.
Motivational aids and rewards	Al-Busaidi & Olfman, 2005	Akhavan & Zahedi, 2014; Sensuse et al., 2018; Wong & Aspinwall, 2005
Training	Lin, 2013; Oumran et al., 2021	OuYang, Yeh & Lee, 2010; Saleh, et al., 2017; Sensuse et al., 2018
Organisational culture	Al-Busaidi & Olfman, 2005; Dei, 2017; Shrafat, 2018	Akhavan & Zahedi, 2014; Brandin & Sterner, 2020; Rao, Nandini & Zachariah, 2022; Sensuse et al., 2018.
IT (infrastructure)	Al-Busaidi & Olfman, 2005; Dei, 2017; Oumran et al., 2021; Shrafat, 2018; Tsai & Hung, 2016	Akhavan & Zahedi, 2014; Saleh et al., 2017; Sensuse et al., 2018.

4. CHAPTER 4: RESEARCH DESIGN

The aim of this chapter is to present the research methodology adopted for the study. The justification for using a qualitative research design and the sample size are described. The data collection and analysis will also be presented, followed by strategies for ensuring data quality and ethical considerations.

4.1. Introduction

Technological advances, the interconnectedness between societies and nations and a move from primary to tertiary industries (services) have culminated in a shift towards the era of the knowledge economy, where organisational capital is migrating from tangible to intangible resources, such as knowledge. The Coronavirus pandemic illustrates how knowledge workers can leverage knowledge since they can work virtually anywhere with an internet connection.

The content of this chapter relates to the empirical objectives as presented in Chapter 1. The research question was formulated as follows:

How may a theoretical framework for the adoption of knowledge management systems in SMEs be conceptualised?

4.2. Empirical objectives

The empirical objectives (EOs) of the study were to:

EO1: investigate differences in adoption factors and CSFs concerning KMS adoption
EO2: describe the influence of KMS self-efficacy on KMS adoption in SMEs
EO3: describe the influence of managerial and leadership behaviour on KMS adoption in SMEs

EO4: determine the influence of technological factors on KMS adoption
EO5: describe the influence of the environment on KMS adoption in SMEs
EO6: construct the final framework for the adoption of KMSs in SMEs

4.3. Philosophical stance of the study

Each person embraces philosophical assumptions in their research through their interaction with the world. Paradigms (e.g., interpretive frameworks) are lenses through which the world is viewed. Moreover, they guide the study's experiences (Kankam, 2019; Creswell, 2014). A researcher can choose from numerous frameworks to inform the research. On a practical level, philosophical assumptions inform the theories that guide a research study.

This study includes the interpretivist ontological paradigm, which accords humans as actors in social roles. Actors' interpretations of their roles differ due to their experience of the external world, which is inherently subjective. As argued in Chapter 2, a one-to-one representation of reality in the mind is impossible due to subjective interpretations of human experiences to us by the human brain. Because the roles that people play as actors are interpreted by them, it has a unique meaning. Additionally, differences in behavioural responses and the influence of context cause people to respond in different ways. An interpretivist stance means that reality can be constructed and explored through shared meanings. Therefore, people can organise themselves in the social world (Schaffer, 2015).

Epistemology is concerned with the theory of knowledge. An interpretivist epistemology asserts that knowledge is socially constructed. Interpretations of cognition understand events through interaction within social contexts. The interviewer and interviewee are intertwined in an iterative communication process (listening, talking, reading and writing) (Schaffer, 2015).

Research following an interpretivist paradigm asserts that the goal of the research is to rely predominantly on the participant's view of a particular situation (Creswell, 2013). Whereas a positivist paradigm focuses on measurement and law-like generalisations, an

interpretivist paradigm emphasises meaning-oriented methodologies, such as participant observation and interviews. Deep, nuanced insights into human behaviour are lost if human complexity is reduced to generalisations (Alharahsheh & Puism, 2020; Saunders, Thornhill & Lewis, 2020; Paulus & Lester, 2021).

4.4. Qualitative research design

The research method for this study is a qualitative methodology, which is frequently associated with an interpretivist philosophy (Denzin & Lincoln, 2008). The purpose of the study motivated the study to adopt a qualitative research approach as he was required to interpret subjective and socially constructed meanings expressed by participants (Saunders, Thornhill & Lewis, 2020). The following quote by Lester and O'Reilly (cited in Paulus & Lester, 2022:32) positions qualitative research methodologies as a field of inquiry, especially relevant in a digital world:

"Even though qualitative approaches are still relatively "new" in the human, health and social sciences, over the last few decades we have seen a gradual growth and acceptance of qualitative work across disciplines and countries. As a methodological community, we have moved beyond the fight for a place for qualitative research, which is evidenced by qualitative research now being taught in many educational curricula and entire journals devoted to qualitative approaches".

Furthermore, in the prominent Sage Handbook of Qualitative Research by Denzin and Lincoln (2011: 3), qualitative research is described as:

"a situated activity that locates the observer in the world and consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including fieldnotes, interviews, conversations, photographs, recordings and memos to the self".

Qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (Paulus & Lester, 2022).

Likewise, qualitative research, according to Creswell (2014: 285), “is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem”. This method relies on documents and image data, is unique as far as data analysis procedures are concerned, and utilises various designs. Questions and procedures are said to emerge from the data (Creswell, 2014).

The purpose of the study is to propose a knowledge management adoption framework for SMEs. An understanding and insights from the lived work experiences of SME employees are required, that is, what factors will enhance and facilitate the adoption of such a system at work and what factors are barriers to adoption. The idea is to inquire and collect such information empirically.

The discussion above indicates that a qualitative research design appears justified as a viable and useful approach to answer the research question and meet the objectives of this study. Within the context of this study, qualitative methods allow novel themes to emerge and thus answer emergent questions with sequential methods adding to the robustness of the findings (Morse, 2010). In line with researchers in this field (Mbedzi, van der Poll & van der Poll, 2018; Dzimba & van der Poll, 2019), a theoretical framework was developed, after which data from mini focus groups and subject experts was collected. Multimethod approaches add robustness to findings not present in either method alone.

4.4.1. Sample size

Multiple cases (organisations) provide a more diverse view of KMS adoption than a single case study. Therefore, multiple case studies have also been conducted to identify broader implications of KM adoption in SMEs (Zieba, Bolisani & Scarso, 2016; Kramer, Klingner, Becker & Friederich, 2016).

The most common guiding norm currently in research regarding assessing adequate purposive samples in qualitative research is saturation. Unfortunately, there has been little consensus on what constitutes saturation (Hennink, Kaiser & Marconi, 2017).

Sample size almost always involves judgement as to what sample will best be able to answer the research question and objectives (Saunders et al., 2015). Regarding sample size, an acceptable guideline is to study a few sites or participants in addition to extensive detail about the sites and participants. Sample sizes for qualitative studies differ considerably from those of quantitative methods since qualitative methods aim to clarify the specific, not to generalise the research findings. Sample size differs significantly among the different qualitative designs (e.g., phenomenology, narrative, ethnography and case study) (Creswell, 2013). However, each qualitative data collection method warrants a specific sample size. For example, Creswell (2013) equates cases with interviews, while other researchers indicate several interviews per 'case'. As alluded to in Chapter 1, the range of interviews per study varies considerably, although Marshall, Cardon, Poddar and Fontenot (2013) suggested 15 -30 interviews.

4.4.2. Saturation

Since the study aims to identify emergent themes, the number of interviews and focus groups is difficult to determine beforehand (Sim, Saunders, Waterfield & Kingstone, 2018). Specifically, Guest, Namey and McKenna (2017) endeavoured to answer the question of sample size for focus groups by determining the point of data saturation. Saturation is more concerned with reaching a point of diminishing return in understanding the phenomenon under question rather than reaching a specific critical point (Mason, 2010).

This study aligns with the ideas of Hennink, Kaiser and Marconi (2017), who describe a few approaches to evaluating saturation. The authors conclude that saturation in focus group discussions, and hence the sample size, can be achieved between four to eight discussions. This sample size is exceedingly sufficient when the samples are homogenous, which is the case in this study. All SMEs were relatively similar; all participants had similar technological experiences and the same socio-economic

background. All participants had used the KMS and were familiar with it. Data saturation was used as a benchmark for the minimum number of interviews.

Six parameters were suggested by Hennink, Kaiser and Weber (2019) when attempting to achieve saturation. These parameters were study purpose, type of codes, group stratification, number of groups per stratum and type/degree of saturation. However, the authors cautioned that no single parameter should be used to determine saturation. Instead, all parameters should be considered collectively. In addition, sample sizes should emphasise a sample range instead of a specific number of focus groups to remain flexible for the inductive process to be followed.

Based on these parameters, a smaller sample with mini-focus groups was justified for this study. This study comprised four mini focus groups of six subject matter experts, totalling up to 24 participants. This discussion-type setup provided richer insights than individual interviews. In addition, individual interviews were conducted with dominant KMS users in the SMEs to lend further validity to the data collection methodology. It is in line with what Hagaman and Wutich (2017) recommended, as sample sizes between six to 16 interviews on the specific attributes of the research and the degree of saturation are needed.

4.4.3. Data Collection

Qualitative sampling aims to present all variants of the phenomenon under investigation, allowing the study to observe the problem from as many perspectives as possible. As discussed above, the interpretivist school of thought underlying qualitative research assumes no objective hierarchy of evidence and methods. Focus groups are group-context interviews that explore the experiences and motivations behind people's behaviour. Focus groups are helpful in cases where group participants are homogenous with the necessary experience and expertise on a given topic. However, authors caution that focus groups are less appropriate where sensitive topics are discussed due to reluctance to disclose information, along with groupthink and power dynamics within the group that can occur (Busetto, Wick & Gumberger, 2020).

An interview is, according to Saunders et al. (2015: 388), “a purposeful conversation between two or more people, requiring the interviewer to establish rapport and ask concise and unambiguous questions, to which the interviewee is willing to respond, and listen to attentively. Interviews also allow for constructs to emerge not previously considered, making the framework more robust.

Forms of interviews are broadly categorised as either standardised or non-standardised. Creswell (2019) and Saunders et al. (2015) point out that qualitative interviews can be structured in three ways: structured, semi-structured and unstructured (in-depth). Semi-structured (of which focus groups form a part) and in-depth interviews were used to gather data typically analysed qualitatively. First, the interviews were audio-recorded, after which the audio recordings of all the subjects were transcribed.

Data was collected until saturation was achieved (i.e., until no new themes emerged and subject matter experts agreed on the themes for validation in the final framework.

The target population in both phases were acquired through snowball sampling in conjunction with purposive sampling. The first samples were acquired through fellow associates after which subsequent participants were acquired through referrals by participants. To ensure that the participants possesed the right criteria for the study, they were contacted telephonically, where theresearcher confirmed that the mini-focus group SMEs already had or intended to adopt a knowledge management system.

Phase 1 Mini-focus groups with SME knowledge management workers

Phase 1 involved four mini focus group discussions with selected SMEs within the Gauteng province. Data was collected between April 2021 and May 2021. The mini focus group participants were recruited through purposive sampling to ensure the ideal SMEs were selected for data collection. The mini-focus groups were semi-structured to allow for discussion around aspects affecting the adoption of KMSs, pointing toward the emergence of new insights from particular open questions while still being guided by a central topic for the prepared questions. In addition, the focus group setup allowed the

participants to generate more ideas than individual interviews employing synergy among the participants.

Several factors played a role in opting to use focus groups (semi-structured interviews). Semi-structured and in-depth interviews are generally used to answer “how” and “what” questions and are typically analysed qualitatively (Yin, 2014). Because the study had already identified factors from the literature, these served as questions posed to the interviewees. As mentioned, the interviews were semi-structured with open-ended questions (Saunders et al., 2015). Furthermore, this study aligned with the philosophical stance of interpretivism. The study utilised mini focus groups to create meaning using social interactions concerning the phenomenon under study (Saunders et al. 2015).

All participants were recruited telephonically and electronically before the focus group and subject matter expert interviews. Participants for the mini focus groups comprised the organisations' full-time employees who had used the KMS within the last three months. The individual face-to-face interviews were conducted as part of Phase 2 and included subject matter experts in knowledge management system adoption.

Phase 2 Face to face personal interviews with subject matter experts

Phase 2 involved six individual face-to-face interviews with subject matter experts. Data was collected between April 2022 and June 2022. The personal interviews were also recruited through purposive sampling to ensure the most suitable experts were selected for data collection. In-depth interviews with subject matter experts allowed the study to probe experts for additional information and follow up on more important issues.

The data collected in Phase 2 further validated the focus group discussions. In addition, given that the propositions were derived from the research, the mini focus groups combined with individual face-to-face interviews provided a feedback loop to validate the theoretical framework which emerged from the mini focus groups.

A sequential study was chosen because Phase 2 (subject matter expert interviews) depended on the data collected in Phase 1 (mini focus group findings). While focus group interviews could follow interviews in a sequential, multimethod study (see, e.g., Mbedzi, van der Poll & van der Poll, 2019), Phase 2 was also used to validate the findings of Phase 1 and could therefore not be conducted in reverse (Mohajan, 2018). Some authors contended that a proper mixed-method design contains both qualitative and quantitative methods, while others have argued that utilising two qualitative paradigms is warranted (Morse, 2010). The final framework combined data collected and analysed from all subject matter experts. Figure 4.6 depicts the two sequential data collection phases developed by the study.

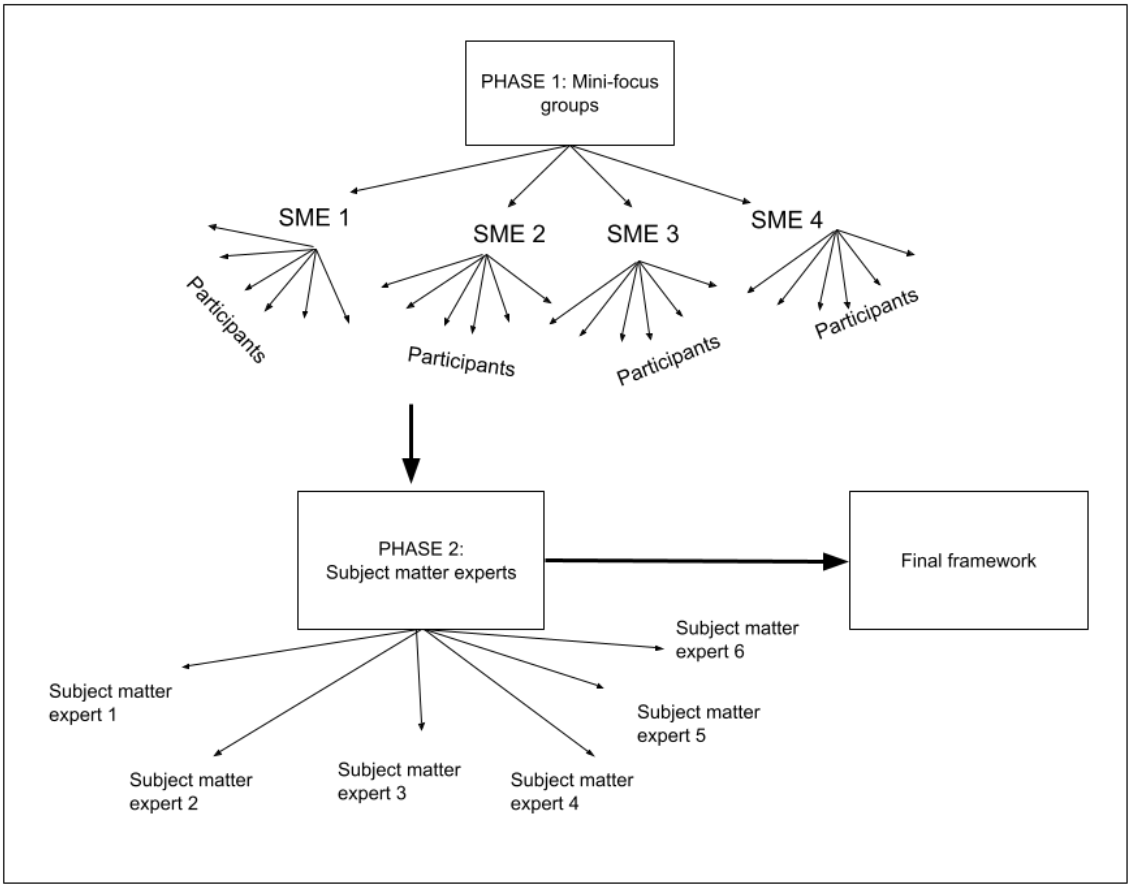

Figure 4.6: Two-phase data collection process used for the study (Source: Own)

In the case of face-to-face interviews, the study ensured that the necessary Covid-19 regulations were adhered to (sanitation, face masks and social distancing).

The researcher personally conducted all interviews. To ensure that the research topic was fully explored, 45-90 minutes were set aside for each personal face-to-face interview. As this study was an exploratory field study on how a theoretical framework of KMS adoption in SMEs can best be described and why those factors are important to the participants, personal face-to-face interviews were appropriate. A multiple-interview approach captures multiple realities (Huang, 2011).

An exploratory study further allows interviewees to explain their responses and allows the interviewee to think out loud about responses not previously considered.

Trust is a great concern when collecting data from participants. Personal contact in mini focus groups and personal face-to-face interviews assures participants how personal information would be used. Therefore, providing sensitive, personal information to someone they have never met is more likely.

Many factors formed part of the discussions concerning influences on KMS adoption. Therefore, the open-ended question included in semi-structured interviews seemed more appropriate. In addition, the order of the questions was altered based on the responses of the participants and experts.

Interview protocol

The interview protocol was based on the preliminary conceptual framework without explicitly mentioning the concepts in the framework.

All participants must have worked at the organisation for at least three months. After the objectives of the interviews were explained, the research questions were put toward each mini focus group expert, as outlined in the discussion guide. If the participants agreed to the interview, an appointment was made at a suitable time at the interviewee's workplace. The researcher conducted each interview. The interviews commenced with open-ended questions. During each interview, interviewees were asked which factors they feel are most critical for KMS adoption success. It included CSFs and other factors that could contribute to successful KMS adoption. In addition, interviewees were asked to describe the familiar factors and their experiences with critical KMS adoption success factors. During the interviews, notes were made about issues or interesting discussion points that

interviewees raised. Later in the interviews, these points were brought up as questions to clarify the stance of the interviewee. After the interview process, each interview was transcribed verbatim and analysed consecutively.

The types of interviews included involved a wide variety of cases with a wide-ranging number of characteristics to ensure a good representation of the data. Therefore, were not only 'average' cases deemed convenient included but also extreme cases where KMS adoption failed or succeeded unexpectedly (Creswell, 2013). Thus, when these aspects mentioned above are considered, the research question could be answered using individual face-to-face interviews.

4.5. Population and sample

This study was conducted in SMEs primarily in the Gauteng province of South Africa. According to the Small Enterprise Development Agency, there were slightly more than 2.3 million SMEs in South Africa in 2020 (Small Enterprise Development Agency, 2021). It indicates a decline of 10.9% from 2020. If knowledge serves as a competitive advantage, it is even more important for SMEs to maintain institutional knowledge to remain competitive. For this study, the population included SMEs, defined SMEs in South Africa as organisations with less than 200 employees. As mentioned in the previous section, SMEs make up the majority of businesses in South Africa and contribute the most considerable portion towards the country's gross domestic product. Therefore, SMEs were chosen for the research as they often employ knowledge workers and are prone to future technological disruption (Ferres, 2019).

At the time of research, the Coronavirus pandemic swooped across the globe at an unprecedented speed, causing many countries, including South Africa, to place their citizens and businesses under total or partial lockdown. The economic impact of the virus' effect still needs to be determined, but the lockdown effect on SMEs was immediate (Bick, Blandin & Mertens, 2020). With a dramatic slump in GDP growth, recovery is expected to take a long time. However, the viable resource, knowledge, can still be used to earn

revenue through, for example, consulting over the internet, highlighting the competitive advantage knowledge can have for an SME during times of crisis.

4.5.1. Population sampling

Purposive sampling is a non-probability, qualitative sampling technique used as the sampling strategy (Saunders et al., 2015). This technique allowed the study to intentionally sample participants and subject matter experts best suited to answer the research question under consideration (Creswell, 2013). The decision to opt for purposive sampling was further enforced by several studies that utilised this strategy in a knowledge management context (Okanga, 2017; Siregar, Puspokusumo & Rahayu, 2017).

The inclusion criteria for the mini-focus groups were less than 200 permanent employees per organisation and the SME should have existed for more than one year. The inclusion criteria for the subject matter experts were defined as at least five years experience in the field of technology adoption either as a consultant or as a technology designer/developer for clients with the purpose of adopting/ implementing technology.

The exclusion criteria for the mini-focus groups were SMEs less than 1 year old; large organisations (employees > 200).
The exclusion criteria for subject matter experts were less than 5 years' experience in the field of technology adoption/implementation.

All criteria were telephonically confirmed beforehand.

In sum, it can be observed that the theme of emergence and holism in complexity theory is consistent with an emergent design and holistic account in qualitative research.

4.5.2. Sample size

For this study, four mini-focus group interviews were conducted in Phase 1. As part of Phase 2, six personal face-to-face interviews were conducted with subject matter experts. The latter stage acted as a validation method for the framework from the literature and mini focus groups, thereby adding to the study's face validity and trustworthiness. The sample sizes were based on the literature regarding preliminary sample sizes. Saturation

was achieved within the estimated samples sample sizes and therefore required no additional interview for both mini focus groups and subject matter experts.

Phase 1: SME mini- focus groups interviews

Phase 1 involved four mini focus group interviews with purposively sampled SMEs.

Phase 1: Unit of analysis

Phase 1: South African SMEs who had already adopted or intended to adopt KM technology.

Phase 1: Population and sample frame

Phase 1: South African SME decision-makers who, at that time of research, used a KMS or participants who had used a KMS in the past.

Phase 1: Method of data collection

In line with past authors (Dzimba & van der Poll, 2019; Mbedzi, van der Poll & van der Poll, 2018), mini focus group data was collected after reviewing the literature and developing a theoretical framework. Interviews were combined with field notes to reveal the participants' verbal reflections on their situation so that their reflections would be part of the reasoning when analysing data.

SME participants were recruited employing personal and telephonic contact that adhered to the selection criteria for the study based on purposive sampling. Data was collected through semi-structured interviews. The researcher conducted and recorded all interviews via an electronic recording device to prepare for data analysis. In addition, the study took notes during the interviews as an added contingency measure and compared notes with the transcripts afterwards.

The personal face-to-face interviews were conducted at the SME location or online via teleconferencing (Zoom, Microsoft Teams, Google Hangout) according to a purposive sampling strategy. In the case of personal face-to-face interviews, the study ensured that the necessary COVID-19 regulations were adhered to (sanitation, face masks and social distancing). The researcher utilised a semi-structured interview guide containing several

open questions to guide the discussions (see Appendix B). Data was recorded verbatim and transcribed by the researcher by hand.

Phase 1: Method of data analysis: Thematic content analysis

After data collection, data analysis was performed through thematic analysis. Thematic analysis is a systematic approach whereby the study aims to identify emerging themes from the interviews and includes all forms of communication, including spoken words and text (Guest, MacQueen & Namey, 2014; Macguire & Delahunt, 2017). It depends on counting word frequency and coding frames based on measurements from the collected data (Braun & Clarke, 2021; Byrne, 2017; Herzog, Handke & Hitters, 2019). Collected data was analysed using Atlas Ti computer software. Data analysis was done through coding and categorising the data, which was used to identify patterns of meaning from which the themes were derived (Saldana, 2021).

The approach for data analysis was based on Braun and Clark's (2006) six-phased approach to thematic analysis. Firstly, the researcher familiarsed himself with the data by taking a 'birds-eye' view of what as said during the interviews. Secondly, the researcher coded the data while also categorising the data. Thirdly, the researcher identified appropriate themes. Fourthly, the themes were reviewed to ensure that they were appropriate for the context . Defining and specifying themes were the fifth step. Finally, the thematic report was produced. The themes were subsequently integrated as part of the preliminary theoretical framework developed from the literature.

Phase 2: Assessment of the face validity of the proposed framework

Phase 2 was based on the themes collected in Phase 1 to validate the findings.

Phase 2: Unit of analysis

Phase 2: Individual subject matter experts in South Africa in the field of technology adoption.

Phase 2: Population and sample frame

Phase 2: Subject matter experts with experience in the technology adoption field.

Phase 2: Method of data collection

Subject matter experts were recruited through personal and telephonic contact that adhered to the selection criteria for the study based on purposive sampling. Data was collected by means of a semi-structured interview guide and personal face-to-face or online interviews. The researcher conducted and recorded all interviews to prepare for data analysis and took field notes during the interviews as an added contingency measure.

The personal face-to-face interviews were conducted at the organisation's location or via teleconferencing (Zoom, Microsoft Teams, Google Hangout). The researcher ensured that the necessary COVID-19 regulations (i.e., sanitation, face masks and social distancing) were adhered to.

Phase 2: Method of data analysis

Data analysis was performed through thematic analysis. Similar to Braun and Clark's (2006) six-phased approach for thematic analysis followed in Phase 1. Data was coded, and themes were identified and defined, culminating in a final reporting of themes. The reporting encompassed discussions on validating the identified themes in Phase 1 and new themes that might lend credence to new themes. In the final analysis stage, a final framework would be constructed, integrating the factors for KMS adoption in the two phases.

Collected data was analysed using Atlas Ti computer software. Data analysis involved coding and categorising the data to identify patterns of meaning from which the themes were derived (Saldana, 2021).

4.5.3. The site or individual

A researcher can sample at the site, event or process, and participant level. This study's sampling was conducted at both the site and participant levels (Creswell, 2013). This means that the number of interviews was conducted at multiple organisations. Each focus group and expert was interviewed at a suitable time agreed on that was not disruptive for

the interviewee. The interview setting was at the SMEs offices insofar as it provides a discreet location free of direct outside influences. Alternatively, interviews took place online via teleconferencing. Apart from asking questions and clarifying questions, the study's presence was minimally disruptive to the interviews. As a result, participants stood much to gain from the interview process. Apart from gaining insights into the latest research on KMS adoption processes and the relevant forces, participants become more aware of how dynamics between different aspects influence KMS adoption.

4.5.4. Purposive sampling strategy

A purposive sampling technique was used to choose SMEs to partake in the data collection. Purposive sampling is a non-probability, qualitative sampling technique where the study uses his judgement selecting participants to answer the research question and meet the objectives (Saunders, Lewis & Thornhill, 2020; Fitzpatrick, 2019; Creswell, 2013). It is a useful strategy when using small samples and in cases that are particularly informative. Furthermore, it allows the study to include a diverse range of interviews, gauge multiple perspectives (Creswell, 2014; Saunders et al., 2020), and select knowledgeable participants about the topic under study (Fitzpatrick, 2019).

With purposive sampling, extreme cases involving only limited referencing to specific themes can also be selected, giving insight into unique KMS adoption factors and user experiences. The participants assisted the study in understanding the emergent process of how the interviewees acquired and used the KMS and their subsequent positive and negative experiences with the KMS (Gresty, 2013). Three aspects needed to be considered as part of this approach: how to select sites or participants, the type of sampling strategy (see 7.2) and the sample size studied (Creswell, 2013).

For the study to collect the data, the necessary considerations were outlined before interviewing could commence. First, a decision needed to be made regarding the specific open-ended research questions for the mini focus group participants and subject matter experts. The discussion guide with open questions can be viewed in Appendix A. Based on the purposive sampling strategy, the study needed to identify SMEs and subject matter experts that were best placed to answer the research questions. The type of interview

best suited to answer the research question was also considered. For gathering data from SMEs, mini focus groups were best suited. As for collecting data from subject matter experts, personal face-to-face interviews were conducted with subject matter experts. Finally, suitable recording equipment was utilised. Data was recorded in audio and video format together with written notes. All interviews were conducted in either English or Afrikaans. When conducted in Afrikaans, the interviews were transcribed and sent for review to monitor accuracy (refer to the data analysis section).

Anticipated issues included faulty recording equipment. Field notes and a second recording device were used to accommodate this issue. Creswell (2013) suggested several considerations concerning data storage that were followed during the focus group discussions and interviews. These included duplicating recordings to mitigate the risk of complete data loss, using high-quality recording devices to ensure clear audio quality able to discriminate between participants and minimising the intrusion of background noise. In addition, the anonymity of the interviewees was protected in the transcripts by redacting the interviewees' names.

4.6. Data Analysis

In qualitative research, data analysis refers to the preparation and organisation of data (e.g., transcripts) for analysis, reducing the data to themes, employing coding and condensing the codes, and finally, representing the data in the appropriate tables, figures or discussions (Creswell, 2014). Preparation includes making analytical judgments while collecting data (Saldana, 2021). The chosen method to analyse the qualitative data was thematic analysis. Thematic analysis is "a method for identifying, analyzing, and interpreting patterns of meaning ('themes') within qualitative data" (Clarke & Braun, 2015: 297). It thus provides a systematic procedure for producing codes and themes for qualitative data analysis. It is thus a method whereby the study looks for recognisable topics, ideas or themes that occur in the data that provide insight into communication (Allen, 2017). Themes were located using the inductive approach (Allen, 2017; Creswell, 2013).

The data was analysed as set out by Braun and Clarke (2006) in their six-phase process. To further augment this process, the process set out by Creswell (2019) was also consulted:

Phase 1: The data was organised and prepared for data analysis. The researcher familiarised himself with the data by reading and re-reading the data while highlighting initial thoughts and ideas. This step included transcribing the interviews.

Phase 2: The researcher coded noteworthy features across the data in a systematic fashion while collating data for each code. Coding the data involved segmenting sentences or paragraphs into categories and then labelling the categories with a specific term.

Phase 3: The purpose of this step was to generate a detailed extraction of the setting or people and categories for analysis. The coding process was also used to generate emerging themes (between 5 and 7) displayed as headings in the findings section. Finally, the study determined how the description and themes could be represented in the qualitative narrative by interpreting the findings or results. For example, the representation can refer to a chronological layout of events, a discussion of themes, subthemes, quotations, and perspectives from specific individuals.

Phase 4: This step involved a review of themes which resulted in a thematic ‘map’ of the analysis.

Phase 5: This step involved defining and naming the themes. In other words, the boundary conditions of each theme and what each theme included and excluded.

Phase 6: The final step involved producing the report, interpreting the qualitative data, complete with convincing extract examples, the final analysis of particular extracts, and linking back to the literature and research question. In essence, the final question concerned, "What were the lessons learned?”

Several considerations were taken to ensure a productive interview process (Leedy & Ormrod, 2014). Data was analysed using the computer software Atlas Ti. The end of data collection and data saturation was justified. Evidence could be found of participant thinking, for example, where alternative explanations for the data were considered and dismissed. Outlying, negative or deviant discussions were also considered and presented where applicable.

4.7. Strategies for quality data

Ensuring quality data in qualitative research is achieved through validity and reliability. However, Creswell (2019) noted that validity and reliability in qualitative research are not the same. Some qualitative researchers refer to trustworthiness and authenticity instead of validity, although Creswell (2013) suggested that researchers use the most comfortable terms. Validity in a qualitative context refers to the employment of specific procedures to establish the accuracy of findings. Qualitative reliability, however, refers to the consistency of the study's approach if different researchers and projects are scrutinised. In a qualitative context, Saunders et al. (2020) refer to reliability, internal validity and external validity as dependability, credibility and transferability, respectively.

4.7.1. Researcher reflexivity

Conceivably, the first logical place to start when addressing the validation process is through reflexivity. The researcher used reflexivity to acknowledge his own assumptions, biases and judgements and how they might have affected his data collection, analysis, results and conclusions. Any power issues which might have played a role in the interviews (especially in the focus group interviews) were also addressed.

4.7.2. Validation

Qualitative research aims to understand the findings, with inferences grounded in data and context. The validation process is not meant only to reach one particular type of understanding, as this stance is in line with a positivist paradigm. Instead, the validity

tests allow both researchers and participants to espouse confidence in the claims made in the research. Qualitative validity is considered one of the key strengths of qualitative research and refers to the study ensuring the accuracy of the findings through specific strategies (Creswell, 2013). In this study, the study used personal face-to-face interviews to validate the data collected from the mini focus group interviews and discussions.

4.8. Dependability

In qualitative research, Lincoln & Guba (1985) refer to reliability as dependability, which indicates the consistency and repeatability of the study's approach to different researchers and projects (Creswell, 2014). It means that the study should be able to duplicate the same procedure and achieve the same results understood and evaluated by others.

Procedures that were implemented to ensure the dependability of the findings included inspecting the transcripts for any obvious errors and ensuring no drifting of codes.

4.9. Credibility

In qualitative research, Lincoln & Guba (1985) use the term credibility as the parallel criterion for internal validity. Credibility refers to the extent to which the findings from the research are relevant to the participants who generate these findings (Ivankova, 2017). Ensuring credibility is important from an interpretivist standpoint as it ensures that the participants' intended realities align with the participants' models of their socially constructed realities (Saunders et al., 2020).

The researcher established credibility through triangulation, which refers to examining evidence from different sources to build a case for the identified themes, thereby reducing researcher bias (Flick, 2019). Data was primarily collected from individual face-to-face

semi-structured interviews conducted with subject experts in four SMEs to perform data triangulation (Flick, 2019). Participation was voluntary, anonymous, and with the choice to withdraw at any time

Academics (supervisors) and peers indicated their agreement or disagreement with the themes identified based on the transcripts and discussions about the interviews with the participants. Should themes converge from several data sources, it can add to the validity of this study (Fitzpatrick, 2019; Creswell, 2014). A way of identifying biases and preventing misunderstanding of data involved the study providing data and interpretations to the participants so that they could confirm credibility, a process known as member checking. Because the interpretivist paradigm asserts that reality is socially constructed, a sample of participants was given their transcripts and the study's interpretation of the transcripts. It ensured that what was said by participants was also what they meant (Fitzpatrick, 2019; Busetto, Wick & Gumbinger, 2020).

Triangulation was also established by means of comparing personal face-to-face interviews with subject matter experts (Dilshan & Latif, 2013). The researcher strived for convergence, corroboration, and correspondence of results from different methods (Greene, Caracelli & Graham, 1989).

Another way of establishing internal validity was debriefing sessions by checking data with participants, including the justification of negative cases. These sessions involved explaining the results or reinforcing the study's interpretations. In addition to forming part of the validation process, it also contributed to the ethical considerations, as the study respected the participants' contributions (Fitzpatrick, 2019).

4.10. Transferability

In qualitative research, Lincoln and Guba (1985) use transferability as the parallel criterion for external validity. Transferability was achieved by making all materials, including research questions, context, design, interpretations and findings, available to the reader to judge the generalisability of findings to other settings of interest. Transferability was

applied using thick descriptions. It involved detailed descriptions of the socio-cultural context that frames the findings, including the time of day the interviews occurred, participants, the place of data collection and additional factors that can provide a richer context of the phenomenon under study.

4.11. Establishing analytical rigour

The data analysis process in qualitative research is iterative. First, the study transcribed the data verbatim, which served as rich data from which inferences could be made. In addition, as new findings came to light after each interview, questions and their sequence could be changed.

4.12. Ethical considerations

Research ethics is a central concern for all social science researchers in the planning, designing, executing, and reporting of research with human participants (Terre Blanche et al., 2006). The consent form required that specific elements be included, such as the right of participants to withdraw from the study at any time voluntarily. It further stipulated that the central purpose of the study and procedures used in data collection be explained. In addition, the protection of the confidentiality of the respondents and known risks associated with participation in the study should be adhered to (Creswell, 2013).

4.12.1. Informed consent

Informed consent refers to the fact that participants are fully aware of the nature of the research and still choose to participate (Langdridge & Hagger-Johnson, 2013). It concerns the client's autonomy and freedom of choice regarding the actions taking place and the client's right to be informed about any overt or covert processes. The researcher ensured that all participants knew what was required of them (Arifin, 2018).

Consent was given freely, and participants were not forced or coerced to participate in any action. They received transparent and accurate information about the study and its potential risks. The participants had the right to withdraw from the study at any time. The

study results will only be provided to the SMEs and subject matter experts internally and were treated as strictly confidential.

4.12.2. *Protection from harm and right to privacy*

Personal information was replaced with respondent numbers to prevent participant identification. Participants were not subjected to any mental or physical discomfort. The content and recommendations were provided only to the SMEs and experts from whom data was collected, and all information in this regard was kept strictly confidential. Participation was voluntary, and no person was identifiable using the information provided. The discussion guides were designed to ensure participants remained anonymous and enhance the honesty of responses.

Each mini focus group and personal face-to-face interview was conducted individually in a quiet room or, when conducted online, in a private room to ensure no outside interference. The researcher was the only person to match participants to visual-audio recordings (Arifin, 2018).

The raw and analysed data was stored securely on the study's password-protected computer. A backup of the raw and analysed data was stored on the study's personal Google Drive. No third parties had access to any of the data.

4.13. Chapter Summary

This chapter outlined the research design that was used for this study. First, consistent with interpretivism as a philosophical stance, qualitative interviews were planned with SME employees who had experience with knowledge management systems. After that, the data analysis process was discussed. The next chapter outlines the findings of the interviews.

5. CHAPTER 5: RESEARCH FINDINGS

The previous chapter outlined the research design, describing the sampling and data validation techniques, followed by ethical considerations. This chapter details the data collection outcomes, culminating in synthesising the findings in a final framework. Data was collected using a two-phased data collection approach. Phase 1 entailed mini focus group interviews with SMEs, while Phase 2 entailed personal face-to-face interviews with subject matter experts of knowledge management systems.

5.1. Introduction

The findings presented in this chapter are aligned with the empirical objectives.

5.2. Empirical objectives

The empirical objectives (EOs) of the study were to:

EO1: investigate differences in adoption factors and CSFs concerning KMS adoption.
EO2: describe the influence of KMS self-efficacy on KMS adoption in SMEs.
EO3: describe the influence of managerial and leadership behaviour on KMS adoption in SMEs.
EO4: determine the influence of technology factors on KMS adoption.
EO5: describe the influence of the environment on KMS adoption in SMEs.
EO6: construct a final framework for the adoption of KMSs for SMEs.

The preliminary framework for KMS adoption in SMEs was outlined and discussed in detail in Chapter 4.

Apart from a qualitative study being chosen, the data collection was completed in two sequential phases. Phase 1 involved SME mini focus group interviews, while Phase 2 involved personal face-to-face interviews with subject matter experts. The rationale for

this approach was based on the findings from Phase 1 presented in Phase 2 to validate the data and create the final framework.

SMEs and subject matter experts were recruited by means of personal and telephonic contact, adhering to the selection criteria for this study. All samples were recruited in South Africa. Data were collected by means of semi-structured interviews and personal face-to-face interviews. The discussion guide aided the study in maintaining focus on the question discussion points (see Appendices A and B).

Data was recorded verbatim and transcribed by the study. In keeping with traditional studies, an integrated approach was followed where more than one theoretical perspective was employed to understand KMS adoption (Oliveira and Martins, 2011). To capture a holistic account of KMS adoption as part of the complexity paradigm, the TOE framework was integrated with the DOI theory, including CSFs. As a result, the literature could offer a solid basis for understanding the elements of the KMS adoption process.

5.3. Unique contribution to the research (KMSs in SMEs)

Authors have argued on integrative approaches for IT adoption when referring to novel technologies that share multiple theoretical perspectives (Oliveira & Martin, 2011). Thus, integrating the TOE framework, the DOI model offers a sound foundation for auxiliary factors that could influence the KMS adoption process in SMEs.

The research framework and instruments offered a sound foundation for alternative factors that could enhance or inhibit the KMS adoption process. Thus, the study addressed the research gap identified by other researchers in terms of factors promoting KMS and the adoption success by organisations (Shrafat, 2018; Zarilla, Ismail & Rosman, 2022). The researchers mentioned above have pointed to a lack of research to determine potential contributing factors for KMS's success. In particular, implementing KM practices in SMEs and developing countries has been neglected (Shrafat, 2018).

As the results point out, the proposed model acts as a theoretical framework for investigating other technological adoptions in SMEs. Furthermore, since the proposed model considers KMS adoption factors in different contexts both within and outside the organisation, it is considered comprehensive since it encompasses different factors that impact KMS adoption.

The TOE and DOI have neglected a reference to the human element. By adding a human behavioural context, the study contributed to the integrative framework by introducing self-efficacy, motivation aids, and rewards. Therefore, the preliminary theoretical framework was enhanced, as was pointed out in Figure 3.6. The mini focus group and personal face-to-face interviews pointed out additional key adoption factors that the study did not observe in the literature.

5.4. Preparing for the interviews

To prevent bias from the study, several strategies were employed. The researcher endeavoured to keep questions open-ended as often as possible. Questions were framed in a general way to prevent the participants from having to refer to the particular SME in which they were employed. Leading questions were avoided as far as possible to prevent the likelihood of only specific answers. Notes were taken of questions that could lead to socially desirable answers.

Due to the possible influence of groupthink, the study did not assume that every participant in the mini focus groups would be equally likely to offer their opinion. To solve this issue, participants were probed for further comments where needed.

When asking questions during the interview and in the data analysis stage, the study was cognisant to not only listen for answers that might affirm the constructs in the preliminary theoretical framework but also discussions at the margins that might give rise to a more robust, expanded framework.

5.5. Contextualising the interviews

It is important to contextualise the interview setting and how the research addressed aspects that might have influenced the interviews. Part of establishing external validity included descriptions of the socio-cultural context that framed the findings, including the setting, participants' behaviours and additional aspects that could provide a richer description of the phenomenon under study.

5.5.1. SME 1

Table 5.5 summarises the participant profile of SME 1.

Table 5.7: SME 1 Participant profile

Participant	Role	Age
1	General manager	40-49
2	Manager/ team lead	30-39
3	Graphic designer	30-39
4	Graphic artist	30-39

The mini focus interview was conducted online in the early evening after a typical workday. All participants joined from their homes in a private space where distractions were limited. The participants were young professionals mostly between 30 and 40 years old. The fact that all participants were males can be a limitation as it possibly biased the research findings. However, it still allowed the study to answer the research question satisfactorily and left room for future research. The primary purpose of SME1 was to develop a software application that allows users to visually identify birds in Southern Africa through bird sounds when using the application. All participants were perceived as very ambitious, as they were employed in an additional part-time business. All participants spent every day working on a computer as part of their responsibilities and had technical knowledge about information technology. Two of the four participants did very technical computer work. One participant studied as a software developer, and another did graphic design. The participants used the KMS virtually daily to communicate, collaborate and assign responsibilities to one another. In addition, they could keep track of each other’s responsibilities and whether tasks were being completed as required.

The organisational structure was flat, with each participant occupying a particular niche speciality. They joked every now and again about each other's capabilities and shortage of skills in some areas, indicating their willingness to share information freely during the interview without fear. Overall, the interview flowed freely, with all participants engaging freely and no participant overshadowing the discussion or venturing off-topic. Participants were comfortable using the KMS, especially for collaboration purposes, and they all found the KMS added value to their collaborative efforts.

5.5.2. SME 2

Table 5.6 summarises the participant profile of SME 2

Table 5.8: SME 2 Participant profile

Participant	Role	Age
1	Researcher	50-59
2	Line manager	30-39
3	Researcher	30-39
4	Administration	30-39

The interview was conducted in person during a normal workday in the SMEs boardroom, where privacy could be ensured. Informal conversations before the interview indicated that participants were eager to engage in the discussion. The age range varied between 30 and 60, with most participants between 30 and 39. Two out of the six participants were female.

SME 2 focused on enhancing human capital in organisations by utilising and developing their own frameworks and tools to solve their clients' problems. The intellectual nature of their offering made their work ideal for a KMS. Microsoft 365 was utilised as a KMS as it provided continuous access, allowing all employees involved in a project to track real-time changes made to documents, files and folders. Furthermore, Microsoft OneDrive was used as a database to store additional files and folders for work-related purposes.

The Chief Executive Officer was very keen to join a discussion about KMS adoption with the study and wanted to share his knowledge with the hope that the feedback would improve the performance of the SME, indicating a willingness to share information.

Talking to the participants before the interview, all had previously engaged in cognitively demanding work and used IT constantly. In addition, all participants were graduates, including a PhD by the CEO. However, based on some answers, some participants were not very familiar with technology in general. Thus, KMS terminology had to be clarified.

Even though the SME has a CEO as its head, it has a flat organisational structure with open communication between all employees where knowledge is freely shared. Overall, the interview flowed easily, with all participants engaging freely in discussions. Often, the interview veered off-topic and had to be brought back to the issue in question. However, this indicated to the study the degree to which participants could freely share their thoughts and experiences.

5.5.3. SME 3

Table 5.7 summarises the participant profile of SME 3

Table 5.9: SME 3 Participant profile

Participant	Role	Age
1	Chief executive officer	40-49
2	Administration	30-39
3	Consultant	30-39
4	Consultant	50-59
5	Consultant	40-49
6	Consultant	30-39

The interview was conducted online during the morning of a typical workday. All participants joined from their respective offices where the disturbance was limited, and information could be shared safely and securely with the study. The average participant was relatively young, with one indicating an age between 50 and 59. Half of the participants were men, and half were women. This SME is headquartered just south of

Pretoria and is involved in implementing cloud-based educational software for primary and high schools all over South Africa. As most employees are working from home, there is a great need for them to be connected over the internet and share their knowledge constantly. At the start of the COVID-19 pandemic, SMEs experienced exponential growth because of a demand for online education. It catapulted the SME into extremely high growth very quickly. The online education sector is very competitive, so acquiring and managing knowledge effectively and efficiently is paramount.

There is a hierarchical organisational structure, albeit with constant, open communication between different organisational levels. The researcher perceived the SME as very innovative based on participants' discussions and aspirations for the business during and after the interview. There is a strong emphasis on striving for excellence as part of how management does things. The participants were all willing to share their knowledge freely. They did not create the impression that there were obvious limits to disclosing information related to the study's questions. All participants utilised computers and other technology daily to execute their responsibilities. Overall, the interview flowed freely, with all participants engaging freely and no participant overshadowing the discussion or venturing off-topic.

5.5.4. SME 4

Table 5.8 summarises the participant profile of SME 4

Table 5.10: SME 4 Participant profile

Participant	Role	Age
1	Educator/Principal	40-49
2	Educator	30-39
3	Consultant	30-39

The setting was a private secondary school based in Pretoria East. The mini focus group interview was conducted in person after school hours in the SMEs boardroom, where privacy could be ensured. In addition, one of the participants attended the meeting online. Two participants were estimated to be between 50 and 60 years old. The focus of their KMS is to be able to retrieve vital historical data for, among other things, tracking school attendance and processing of marks.

The organisational structure is hierarchical, as the school is owned by a parent organisation that owns multiple private education brands in South Africa. At the school level, the organisational structure is also strictly hierarchical, with the principal as head of the school, department heads reporting to the principal and teachers reporting to the department heads. At the teacher level, the organisational structure is flat, with teachers sharing information freely with each other. Communication between teachers was simple but communicating with and effecting change on the KMS was cumbersome, as the IT technicians and physical hardware was situated in India, and other schools utilised the same IT platform. This created numerous bottlenecks and unnecessary pressures for teachers when accessing, processing or uploading data to the server. Uploading learner marks to the KMS created exceptionally high stress levels as the marks could only be processed and uploaded in a concise period, causing frustration.

The perception was that all the participants (teachers) shared similar frustrations with the current and past KMSs. Overall, the interview flowed easily, with all participants engaging freely and no participant overshadowing the discussion or venturing off-topic. The need to speak up when presented with an opportunity to share their experience was notable, especially when participants were asked to discuss aspects that caused high frustration.

Any power-related issues which might have played a role in the mini focus group interviews were addressed proactively. It was done to ensure participants spoke up and engaged fully in the interviews and to ensure analytic rigour (Fitzpatrick, 2019). For example, the CEO of SME 2, who participated in one of the interviews, most often shared his knowledge freely and encouraged other participants to do so. In another SME, the school's principal also freely shared her knowledge with the other teachers and did not indicate to the other participants what they could or could not say during the interview.

While transcribing the data, the transcripts were inspected for any obvious sources of error. In addition, around 20% of codes were inspected twice to ensure no drifting of codes. As described before, a method through which credibility was achieved was the triangulation process aimed at a broader, more comprehensive understanding of KMS adoption in SMEs (Flick, 2019). Transcripts were shared with supervisors and a sample

of participants, including subject matter experts (i.e., member-checking), to indicate their agreement with the themes identified based on transcripts and discussions. Furthermore, to prevent data misinterpretation, the thematic analysis involved discussions with participants and identifying possible researcher bias. Due to the non-technical nature of the questions and the data not being sensitive, the possibility of misinterpretation of data could be mitigated.

Another way internal validity was established involved a justification and deliberation of lesser-cited themes. For instance, where a participant did not agree with an aspect of the framework, the aspect was still considered part of the overall framework. In addition, discrepancies were also researched and noted (Fitzpatrick, 2019).

In agreement with the qualitative methodological research selected for this study, several propositions were formulated, forming the basis of the preliminary theoretical framework to guide the discussions in Phase 1 of the data collection process. The theoretical framework went through an iterative series of analyses rooted in the propositions from information technology and, in particular, the KMS adoption literature. A total of eight propositions were identified through a comprehensive literature review, outlined in Table 5.5 below.

Table 5.11: Propositions together with their formulation. (Source: Researcher's own)

Proposition	Formulation
P1	KMS self-efficacy facilitates KMS adoption in SMEs
P2	Motivational aids and rewards facilitate KMS adoption in SMEs
P3	Relative advantage facilitates KMS adoption in SME
P4	KMS compatibility facilitates KMS adoption in SMEs
P5	Low KMS complexity facilitates KMS in SMEs
P6	Top management support facilitates KMS adoption in SMEs
P7	A quantum leadership style facilitates KMS adoption in SMEs
P8	Competitive pressure facilitates KMS adoption in SMEs.

5.6. Population and sampling frame

The study population was composed of SMEs in South Africa, defined as a staff complement of fewer than 200 employees. Accordingly, large organisations (>200 employees) and SMEs less than one year old were excluded from the study.

The SME subject matter experts participants needed to be between the ages of 25 and 65, and the SME had to function for more than one year. Subject matter experts were selected from South African organisations where the experts are between 30 and 65 years of age. In addition, the experts had to have at least five years' experience in the field of technology adoption, either as a consultant or as a technology designer or developer for clients who wanted to adopt and implement technology. All subject matter experts were selected based on their experience in managing and implementing projects related to knowledge management systems and ensuring their adoption. Each interview lasted until the interviewer and subject matter expert asked and answered all questions and had no additional comments related to adding or removing aspects to the framework.

The sampling frame is as follows:

Phase 1: SMEs in South Africa where the organisation was applying a KMS, or the research participants used a KMS before.

Phase 2: Subject matter experts with experience in the technology adoption field.

5.7. Data analysis using thematic analysis

The data analysis followed the data collection phase as soon as data saturation was reached and theorising more data delivered no new concepts (Saunders *et al*., 2018). Saturation in qualitative research is often used to guarantee research rigour (Fusch and Ness (2015: p: 1408). After that, the collected data was coded and analysed using Atlas.ti qualitative data analysis and research software.

The researcher conducted and transcribed all interviews by hand, and the data was analysed using thematic analysis. Thematic analysis is a systematic approach whereby the study aims to identify emerging themes from the interviews and include all communication forms, including spoken words, texts or other formats. It depends on counting word frequency and coding frames based on measurements from the collected data (Byrne, 2017). The data from subject matter experts were analysed using a thematic analysis phased approach set out by Braun & Clarke (2006) based on an interpretivist epistemology and ontology.

Established coding procedures and recommendations were followed to ensure the trustworthiness and rigour of the qualitative research. In addition, the divergent code findings were regularly discussed along with doubtful cases to pair up themes with existing constructs in the literature.

As a first step, the researcher familiarised himself with the data and went through the data repeatedly. The data analysis contained multiple steps involving numerous, continuous iterations of reviewing and theorising the data. First, the study wrote down preliminary observations and precoded the data. Then, while the study was writing notes in the field and transcribing recorded interviews, keywords and phrases were jotted down, highlighted, bolded, and underlined to emphasise frequently emerging passages and quotes from participants (Saldana, 2021).

Analytical memos “are essential conversations the study has with him/herself about the data and act as a dumping ground for the study’s thoughts and ideas” (Clarke, 2005: 202). It is part of the process of generating codes and categories. As part of this process, the study reflected on the data by consulting the participants in the coding process to validate the data.

These methods were chosen to explore and understand what the data represents. The exploratory methods combined well to give an initial overview of the findings and hence to systematically work towards more fine-grained data from which the codes and categories could be developed.

These coding approaches best served to answer the research question of this study.

As part of first-cycle methods, the process started with generic coding methods. Then, the holistic approach was used to get a bird's-eye view of the transcript. The holistic approach is also exploratory, allowing the study not to get bogged down with the details of the codes and categories prematurely.
An additional exploratory method utilised was provisional coding. Provisional codes establish a start list of predetermined codes based on this study's preliminary theoretical framework in the literature, anticipated responses and categories and hunches. Finally, iterative coding was used for the study to attune himself to the participant's language and perspectives (Saldana, 2021).

Second-cycle coding involved categorising the initial codes. The categories emerged through sorting and comparing the categories for similarities and differences using Microsoft Excel. For example, one of the categories identified was time as being very important to participants. Conversely, a KMS that results in wasted time and leads to an inefficient working environment was seen as counterproductive.

In the third cycle of code mapping, the categories were narrowed down to the final themes depicted in the model. Again, longer-phrased themes were selected, which ensured that the codes were descriptive.

5.8. Findings from focus group interviews

In reporting the findings, the theoretical framework of organisations as complex adaptive systems (CASs) was kept in mind. CASs implies that systems are composed of interconnected, interactive and interdependent elements adapting to their internal and external environment in the face of constant change. KMS adoption is thus an emergent outcome, dependent on various contexts reinforcing and balancing each other.

A total of four focus groups from four SMEs were interviewed either in person or online. A discussion guide was used to keep discussions relevant and give participants sufficient time to express their views. Each interview lasted more or less 60 minutes.
The following convention was used for participant interviews:

X^{th} participant in the mini focus groups (FG)
Therefore: Y = FGy.x

Since participants had to access a KMS either in the past or actively use a KMS, the participants intuitively understood what was meant by the term ‘knowledge management system’. One respondent commented that the utility of a KMS is dependent on the goal of the KMS.

Based on the mini focus groups, the study identified eight themes by means of the output of the data and subsequent analysis. The emergent themes were identified for frequency and significance based on the context in which the concepts were mentioned. The themes were User experience of the KMS interface, Technical support for adoption, Top management engagement, Purposeful work contribution, Becoming knowledgeable and motivated through empowerment, Striving for excellence in work responsibilities, Transitional space and time from old to new systems, Incomprehensible interaction between the user & KMS and Obstructing efficient use of time or resources. Below the findings from the focus groups are presented.

5.8.1. User experience of KMS interface (f = 79)

This theme relates to the interface of the KMS itself. User experience refers to “an overall experience involving emotions, thoughts, perception, reactions felt by the user and thinks by his/her usability of that product or service” (Sharma & Tiwari, 2021: 42). It is related to the ‘Incomprehensible interaction between user and KMS’ theme discussed below.

Nuances of user experience have been studied in technology adoption. Davis (1989) has investigated perceived usefulness and ease of use as part of the technology adoption model (TAM). Aman and Yusof (2022) found, contrary to others, that perceived ease of

use had no significant direct effect on KMS adoption across various industries. Instead, shortfalls in user interface design were found to be the most important critical success factor for KMS design (Damodaran & Olphert, 2000). In line with these findings,
usability was a critical success factor in conjunction with the user interface. It is an important design consideration as the interface sets a common reference point for users from where the KMS can be accessed (Halawi, McCarthy & Aronson, 2017; Tiwana, 2000).

When the question was asked, 'What would make you adopt a KMS more?', responses ranged from the system allowing convenience, user-friendly, autonomy and a need to 'get things done'. When the question was reversed by asking, 'What would make you use a KMS less?' participant responses aligned with the question. If the KMS wastes the respondent's time and takes too long compared to previously used methods or if the KMS makes it more difficult for the respondent to do their job, then the KMS is also less likely to be adopted.

This theme was by far the most prominent of the themes identified based on frequency, mentioned a total of 79 times. In addition, almost every participant in all the SMEs emphasised that the KMS is conducive to the adoption of cognitive, emotional, or perceptual workload can be decreased.

The word 'time' was mentioned 46 times when users were asked questions relating to their rationale for adopting a KMS, emphasising the evaluability of saving time, hinting at the importance of efficiency and effectiveness for participants. In addition, any technology that wastes the participant's time and acts as a barrier to completing their responsibilities inhibits adoption. One participant noted

FG1.1: "Time constraints…time's a precious commodity."

Being efficient and effective also ranked high on the participants' priority lists. Most often, participants were concerned with the KMS producing a wanted result. For example, in one focus group, one participant did not adopt an integrated telecommunications system that would save employees considerable time because the participant felt it was too

difficult to learn the system's many functions. It happened despite the participant acknowledging that the benefits of adopting the system far outweigh the resistance. The barrier to adoption was so high that the participant opted to use his mobile phone to call customers.

> *FG4.1: "… I didn't need a manual, because remember that it is so, I still have some programming background, but I am still dumb when it comes to coding. But that is so simple, I can just use it. Because you immediately understand the layout because it is designed so simply."*

> *FG1.2: "I think one of the central goals of such a system is to make life easier for everyone but to get there, you have to put a bit of effort. If the employees can literally realise how it frees up their time and they must feel 'oh well, it's easy, I do it on the system, I don't need to do it manually or send it individually for a hundred people. But those results should be very tangible."*

> *FG4.3:* "*Literally no one taught me how to use it. I logged on, and very basically I was able to say 'Okay, this is where I would do an absentee, it was just so straightforward… I could logically, without any assistance figure it out. I didn't have to wait any amount of time to generate, once it's there it's on the system."*

In summary, participants noted the following aspects as part of an improved user experience:

<u>Speed</u>

The faster KMSs can serve the relevant content; the more likely adoption will be

<u>Effectiveness</u>

To allow job descriptions to be completed by participants

<u>Efficiency</u>

Allow participants to conduct their work responsibilities while freeing up time, so participants have more time after work

5.8.2. Technical support for adoption (f = 5)

Technical support for adoption refers to the assistance KMS users receive before, during and after the adoption of the KMS. Support entails training in the form of material, workshops, manuals, procedures and additional infrastructure necessary for the user to adopt the KMS. It does not involve the design of the KMS or updating the system's content. Compared to other themes, technical support was the least mentioned theme, only having been mentioned five times.

One barrier to IS adoption is the high cost of training users. Among the challenges identified in KMS implementation is that users must have enough knowledge and training about the KMS (Lisanti, Luhukay, Veronica & Mariani, 2014).

Several participants mentioned that (initial) training would not be sufficient for KMS adoption. Physical infrastructure, such as a stable, reliable internet connection, must also be supplied and function correctly. In contrast, participants noted that insufficient training and support would make participants less likely to adopt the KMS.

Participants indicated that they need the help of a manager or senior person to assist in acquiring the expertise to use the KMS. In addition, when the participant interpreted the learning curve as too steep or the technology as ‘intimidating’, it led to resistance to the KMS, or users tended to lose enthusiasm for using the KMS.

These findings are consistent with the views expressed in the literature and refer to the need for context-specific, appropriate training in line with the user’s responsibilities. Furthermore, supporting users on a technical and non-technical level can facilitate the adoption of the KMS (Dei, 2021; Lin, 2014).

The particulars of what was meant by technical support were explained as such:

FG4.2: "Technical support I think is what's most important, you know, constantly offering training or workshops or you know, getting people the know-how. If they're struggling, let them get the know-how."

FG3.1: "I think if you force people to use it without giving them the necessary skills as well, whether it be training or technology, of you don't give them access to good internet, if you don't give them access to good resources, but you force them, simultaneously, to use it, then they are not going to use it. I think that is a big demotivator".

FG3.2: "... there must be proper training, irrespective of the platform,... Because the more I know how to use the system, the better I will use it. If it is going to take more of my time to figure out how to use the system, then I will waste more of my time, then I'm not going to use it where I would rather have worked."

5.8.3. Top management engagement (f = 12)

The responsibilities of employees can only happen if the necessary support is provided by top management. Top management support is among the most important factors in ensuring IS and KMS adoption (Al-Haderi, Rahim & Bamahros, 2018; Hwang, 2019; Khayer, Talukder, Bao & Hossain, 2020). The extent of top management support is unequivocal regardless of task interdependence (Hwnag, 2019). Findings in both KMS adoption models and CSF literature identify top management as necessary in adoption (Khayer, Talukder, Bao & Hossain, 2020).

The participants found that support is more nuanced and should entail a physical hands-on approach to supporting a user. Therefore, Top management engagement emphasises that employees require their needs to be taken care of to complete their tasks satisfactorily. Top management engagement extends further than top management support in that it encompasses the embedded nature of top management. Engagement is about top management ensuring that supporting structures are available to facilitate KMS adoption. Top management takes personal responsibility and ensures that adoption

requirements are within the employees' capabilities. All SME participants noted the role of top management in some way or another in assisting with this process.

The researcher found that participants demanded that top management immerse themselves with the KMS users by making contact and observing the KMS use to gain a first-hand account of how users use the system, what they struggle with and how the KMS needs to accommodate their needs. However, the study could not find any studies that refer to top management engagement as a relevant determinant for KMS adoption. This finding was thus not consistent with the literature. However, the literature indeed hints at the importance of the involvement of top management in the adoption process, as it contributes to efforts that garner approval and active participation from the organisations (Lisanti, Luhukay & Mariani, 2014).

Management involvement is described as the influence management has in KMS adoption and utilisation (Brandin & Lundgren, 2022), with no specific reference to top management engagement as defined in the study. However, management support and involvement were demonstrated to be critical success factors in KMS implementation and adoption in a case study by Halawi, McCarthy and Aronson (2017) and Khayer, Talukder, Bao and Hossain (2020). In addition, management involvement promotes user buy-in, thereby fostering a change in organisational culture.

The usefulness of an information system requires both motivation and user involvement for users to motivate knowledge transfer (Gefen & Reychav, 2010).

The question was posed, ‘What characteristics would you expect from management to help you use the technology?’ Participant responses were in line with the impression that management should become immersed in the KMS adoption process and not only be involved with the administrative processes and measurements accompanying adoption (e.g., user reviews and surveys). In addition, participants specifically reiterated the personal contact and responsibility management must take for the KMS.

> *FG 4.2: “if management ask (sic) their employees ‘what’s your feeling, are you coping with the system, yes or no, and then they take it serious, and then do*

something about it and give feedback, that's a good trait... Keep everybody on board

FG3.2: It comes again that management can make a decision, but they must also be open from "critique" from below. I have been in a situation where I worked for someone where they had a 'my way no highway option' um, management system…

FG 4.2: So, they must have some kind of understanding as to what they require of you, um, you know, their expectations mustn't be too large for me to handle it as a blue-collar person. It must be within my field, within my capabilities. They can also extend the capabilities, they can challenge you, but with, also good attitude.

FG 4.3: That's a good point. In other words, the higher-ups; they need to know more about the system than you do, because they need to understand, like Casey said, they need to understand when you are struggling to produce results because the system… They need to have sympathy for why it is happening. Or at least say 'this has to be improved'.

One respondent reported that they realised the full benefits of a KMS for their work, yet they did not opt for full adoption as nobody was allocated to demonstrate using a KMS. In addition, employees were not able to help each other without the help of a knowledgeable manager. As a result, the system was essentially useless, as a participant commented:

FG 3.4: "We know we have all these functionalities, but there is no one to show us how it works, and we cannot figure it out between ourselves. So, what do we do? We leave it."

5.8.4. Transitional space and time from the old to the new system (f = 9)

The transitional period refers to a phase between fully adopting the new KMS and removing the old KMS so that participants can no longer use the old system. The researcher did not find any literature related to this concept.

Information systems do not exist in a vacuum inside an organisation. Adopting the KMS is influenced by whether users are familiar with the technology or the organisation has implemented such technology. Participants asserted that if users are given sufficient time to habituate to the new workings of the KMS, they were more likely to adopt the new system.

Only two participants mentioned the need for a transition period a total of nine times. However, it is still a salient theme since new users need to orient themselves to the new system, and every new KMS involves rejecting the old system. It is also likely that an employee will have to adopt a new KMS or adopt new features (and reject old ones) at some stage during their tenure, even though it could be the first time they utilise a KMS.

Answers were insightful when the questions were framed regarding adoption and why the participants would not adopt the KMS. For example, participants mentioned that there needs to be a transition period between the old and new KMS, which needs to be adopted. However, another participant noted that they did not require a transition period to the new KMS.

> *FG3.2: You know 'just give me time to get to know the new one, then I will transfer my stuff to this one'. And I think it is important to create this space for the people who want to take time to get to know the system and they are also more prone to adopt the new system if they are given a chance to have the transition phase*
>
> *FG3.1: "Yes, and I think the learning curves should perhaps not be too large or too long, so it doesn't get someone under."*
>
> *FG 3.2 If it's not going to make a difference to my workload and the speed at which I do my work, but it costs our business a lot less, then it will make sense to*

me to transition [to the new system]. But I think the biggest aspect will be if we can do our work faster and more efficiently.

The better the alignment of new technological capabilities with the current demands of users, the more efficiently the task will be executed. Thus, a task-technology fit between the user means the user is more likely to perform the task and lower the costs of task performance are likely to be (Goodhue & Thompson, 1995; El Said, 2015). In contrast, where there is a misalignment between technology and the work needs of users may not be adopted (Kuo & Lee, 2011). This concept contributes to the originality of the study.

Personal Development Context

Three themes were conceptualised as part of the Personal Development context. The themes stipulate participants' intrinsic drive to improve their work skills.

5.8.5. Becoming knowledgeable and motivated through empowerment (f = 10)

Participants pointed out that training and technical support are important aspects of adopting a KMS, both as part of the initial stage and continuously for the KMS adoption process. This theme was mentioned a total of ten times. However, the study could not find recent scholarly literature on the theme. One way participants expressed learning more about the KMS and thus more motivated towards continued use was illustrated thus:

> FG3.2: *"If you at least tell me 'this is how you use it' and then a basic training session or a training manual or something that I can refer back to so that I know how to use it, then it will increase my willingness to use it because then I know where to start".*

A participant expressed towards her colleagues that they should not be afraid to make mistakes when using the KMS, observing that they should develop an inclination towards mastery

> FG3.3: *"... what I would like to see is the value of openness, that growth mindset, and the willingness to make mistakes, not scaredness for the intimidating system".*

The CEO of one SME who himself engaged in the interviews believed that the organisation will direct employees towards a greater purpose but that there needs to be a degree of autonomy and self-directedness from the employees.

> FG2.4: *"People must be mature, they must be directed, they must know their calling in life; they must take responsibility and drive growth and development, and we will direct. But nothing more than that. I cannot work in such an environment."*

The author is reminded of research by Pink (2009), which, through a synthesis of the contemporary motivation literature, concluded that mastery, purpose and autonomy are fundamental intrinsic motivators (Pink, 2009). It is conceivable that mastery could form part of this theme.

Overall, the personal development identified to support the adoption of the KMS is

A willingness to attempt to adopt the KMS
It would be rational for an individual to, at the very least, attempt using the system before resisting adoption.

Become studious and thereby more empowered
By showing an attitude towards becoming more studious, an individual can become more motivated towards KMS adoption and thus become more empowered in their work tasks

A positive attitude towards the novelty of the technology
Related to self-efficacy is the adoption of a particular attitude towards technology and its meaning for the user.

5.8.6. Purposeful work contribution (f = 10)

The literature did not explicitly mention the need for users to see a greater purpose in adopting the KMS. Instead, participants stressed that purpose and meaning served as strong motivators. Findings were nuanced in that some participants referred to the purpose of the KMS for their work (i.e., why do I need to use it?) and the role of the KMS in improving their work performance.

> FG3.2: *"If it's something we want to use, and we know that it will contribute to a positive work environment, then I will say we should embrace it completely and learn to use it and then to give them the tools to do it and then say, 'now you have to use it."*

Participants yearned for a purpose beyond just adopting the KMS. The need exists with participants that the KMS needs to help them work more efficiently instead of just mechanically processing information and managing knowledge.

> *FG: 2.3: People struggle to know which information to get. So, they start looking at the wrong things, which is not founded correctly. To make it as user-friendly as possible so that you can apply it for the purpose for which it was implemented."*

On the other hand, a lack of leadership clarity leads to resistance to the adoption process. This

> *FG1.4: "I want to see where we are going with this, why we are doing this. Then I will jump in wholeheartedly. But if I ask you 'why should I do this?' and you tell me 'Just as well, then it unleashes a bit of a rebel in me."*

In line with Pink (2009), this theme could form part of the purpose as a key motivator to adopt the KMS. The KMS could act as a vehicle for the user to achieve purpose in their work. The need for a purposeful work contribution is unique to the study. This theme is not consistent with the literature. No reference to a purposeful work contribution could be found.

5.8.7. Striving for excellence in work responsibilities (f = 9)

Being able to master technology is an instrumental step towards adopting a KMS. Striving for mastery continually so that work responsibilities can be executed with increasing accuracy and efficiency emerged as a theme. Numerous discussions from participants centred around endeavouring to do their work better continually. One particular SME interviewed utilises a psychometric tool to improve workforce optimisation and human capital utilisation as part of their offering to clients. The participants in this SME frequently framed responses using the optimisation tool terminology. The concept of an innovation score refers to an individual's propensity to take on more demanding tasks. The higher the score, the more demanding the task the employee is willing to take on. This theme includes the concept of mastery.

> FG2.1: *"...to simplify is one role, but the person's innovation scores. So, propensity to change is for me, like, I'm okay with it, but the person's innovation tendency to say, 'I want to find a new way and better way and a more efficient way'.*

Similarly, another participant responded to a question on values influencing KMS adoption, and a participant answered as follows:

> FG2.4: "*I want to be more effective… I want to have a bigger impact in the world. And tools that, be it a machine or a system, that can help me do what I do, I am going to want to adopt. Yes, because I want to be great."*

The opposite perspective was also observed

> FG3.3: "...*I think I can come in here. I think work pride is another thing. I mean, if that means that I have to work on this system that contributes nothing to my work, then I will also push it aside. Because I am busy too, the work I am supposed to do is falling behind because I am working on a system that doesn't contribute to my work… So I agree with [participant] completely".*

This theme was not observed in the KMS adoption literature. It, therefore, serves as a unique contribution to the study.

Technology adoption barriers

The context of technology adoption barriers was introduced to emphasise not only the factors that make a KMS conducive to adoption but also those that inhibit adoption.

5.8.8. Obstruction of efficient use of time and resources (f = 9)

One of the most persistent key points made during the interviews was participants pointing to the value of time and the availability of sufficient resources to understand and use the KMS. This finding is consistent with the KMS and knowledge-sharing literature. This literature has identified numerous barriers to KMS. Time and resources were the most prominent barriers to KMS use (Van Offenbeek, Boonstra, & Seo, 2013; BenMoussa, 2009). A consistent theme throughout the discussions was related to the need to supplement time and resources where possible. This finding was particularly pertinent at one of the SMEs (a private secondary institution). The educators are inundated with administrative duties (e.g., calculating marks and writing reports) on top of their daily teaching responsibilities. It caused one of the educators from the private school to state:

"We have limited time per day. And our main focus is to teach. So, I would say my approach to any system would be is, will this system help me be a more effective teacher? If it's gonna take more time, and I'm gonna lose effectiveness because I am taking longer to work on the system, then it's a value that's gonna discourage me to use the system." (FG4.1).

One participant expressed an additional typical complaint:

> *"Time constraints. That's probably the most important fact I would say. Time's a precious commodity and if you take forever to get the stuff from the KMS, then it feels like it's a waste of time." (FG1.1)*

Another participant referred to a propensity for resisting a KMS should the system impede their effectiveness in having more time available to do other things.

Similarly, a participant from another SME also considered the reasons for the resistance without probing the participant.

"Maybe one should approach it from the perspective of why don't we use it or why don't we use it as much as we should. From my perspective personally, it makes it just a matter of time... If the reward is that you can spend less time on work and looking for things, then I think that's the type of carrot that will work for me . . . to spend less time on crap." (FG1.1)

This theme illustrates a positive reinforcing feedback loop that could increase users' resistance. As one user resists the KMS, another user might also resist due to a lack of contribution towards the KMS to the point that no user is adopting the system, rendering the KMS less useful.

5.8.9. Incomprehensible interaction between user and KMS (f = 18)

The second-most frequent response, with 18 responses referred to by respondents, was Incomprehensible interaction between the user and KMS. Incomprehensible interaction between the user and KMS relates to the theme of User experience of the KMS interface. However, it is a more nuanced concept in that participants want their KMS experience to be free from effort as much as possible. Whenever the KMS hinders progress toward a goal, it inhibits the adoption process. Instead of emphasising the features required to enhance adoption, this theme highlights what frustrates the user insofar as the user cannot understand the functionality to the extent where they can execute their tasks using the KMS, which hinders their productivity.

Taken together, participants alluded to two points. Firstly, resistance when participants experienced increased effort to use the KMS compared to doing their work the old way (even if it meant doing it manually). Secondly, resistance was also experienced when the KMS required too much learning quickly. Unfortunately, the study did not find scholarly references on this theme.

It was found that when a question was framed negatively, new meanings emerged. For this reason, the questions were framed for participants to indicate why they would not adopt a KMS rather than looking for reasons to adopt the KMS.

> *FG4.3: "I think if the one we're using, it's just so tedious…. I'm someone who tries to logically figure out. So, it really needs to be convenient, it needs to be user-friendly, um, else it just becomes a burden, then it's not really solving the problem."*

A noteworthy comment from an SME participant who utilise a KMS collaboration tool to track the progress of tasks within their team implied that they were likely to continue using the KMS even though it is not the most user-friendly tool. Thus, the participant implied that continuance of the tool usage will persist despite the fact that changing to a different system might be more beneficial.

> *FG4.1: "I mean, even if Miro is a mess, we're still going to use it, it's just going to be difficult to use it because we need it now…. I feel the quicker we move on with something, we are going to do it faster because it is a mess because it is not easy to use. The need is very large for certain things at certain times".*

> *FG3.1 Yes, I think to a large extent. I think it can for the person who is the least scared of technology and very studious, really be an eagerness damper if you cannot understand what to do where and what a system can achieve and what it can do and if you do not know it and you cannot easily figure it out…*

> *FG3.2: So, I think if you choose an MS [management system], you are going to choose it based on how 'idiot proof' it is. And yes, there will be functionalities that you discover as you start using it and I have to at least know how to switch it on. It doesn't help you deliver me a computer, and I don't know how to switch it on, because after a while I will become frustrated and not use it.*

5.9. Discussion

Thus far, the research discussed the factors the study identified as salient in the literature, culminating in a proposed framework. Subsequently, themes which emerged from the mini focus group interviews were identified. Finally, the literature findings were integrated with the mini focus group interview data to present a framework. The framework detailed the identified eight themes, namely Obstructing efficient use of time or resources, Technical support for adoption, Top management engagement, User experience of KMS interface, Becoming knowledgeable and motivated through empowerment, Purposeful work contribution, Striving for excellence in work responsibilities, Transitional space and time from old to new systems, and Incomprehensible interaction between the user & KMS.

Figure 5.7 illustrates the characteristics of CASs within the context of the emergent themes affecting KMS adoption in SMEs. SMEs exist in an open system, exposed to external influences (e.g., information) to affect KMS adoption, while the KMS can also affect the external environment (e.g., via competitive pressure).

Within an SME (green band), which is itself an open system with flows of information and resources, various contexts exist to affect the adoption of KMS adoption. As the legend indicates, some concepts were identified from the literature, while others were identified from focus groups. The researcher evaluated the similarity of the concepts to determine which concepts should be grouped together. The dashed lines of the concepts demonstrates the open and interactive nature of each context. This nature is further enforced through positive and negative feedback loops.

Similarly, there is open, interactive and interdependent feedback between the SME and the external environment as indicated by the effect of the reciprocal nature of competitive pressure on the SME. Finally, the accumulation of these interactive feedback loops coalesce to feed back into the adoption or resistance of the KMS, with adoption being the ideal state.

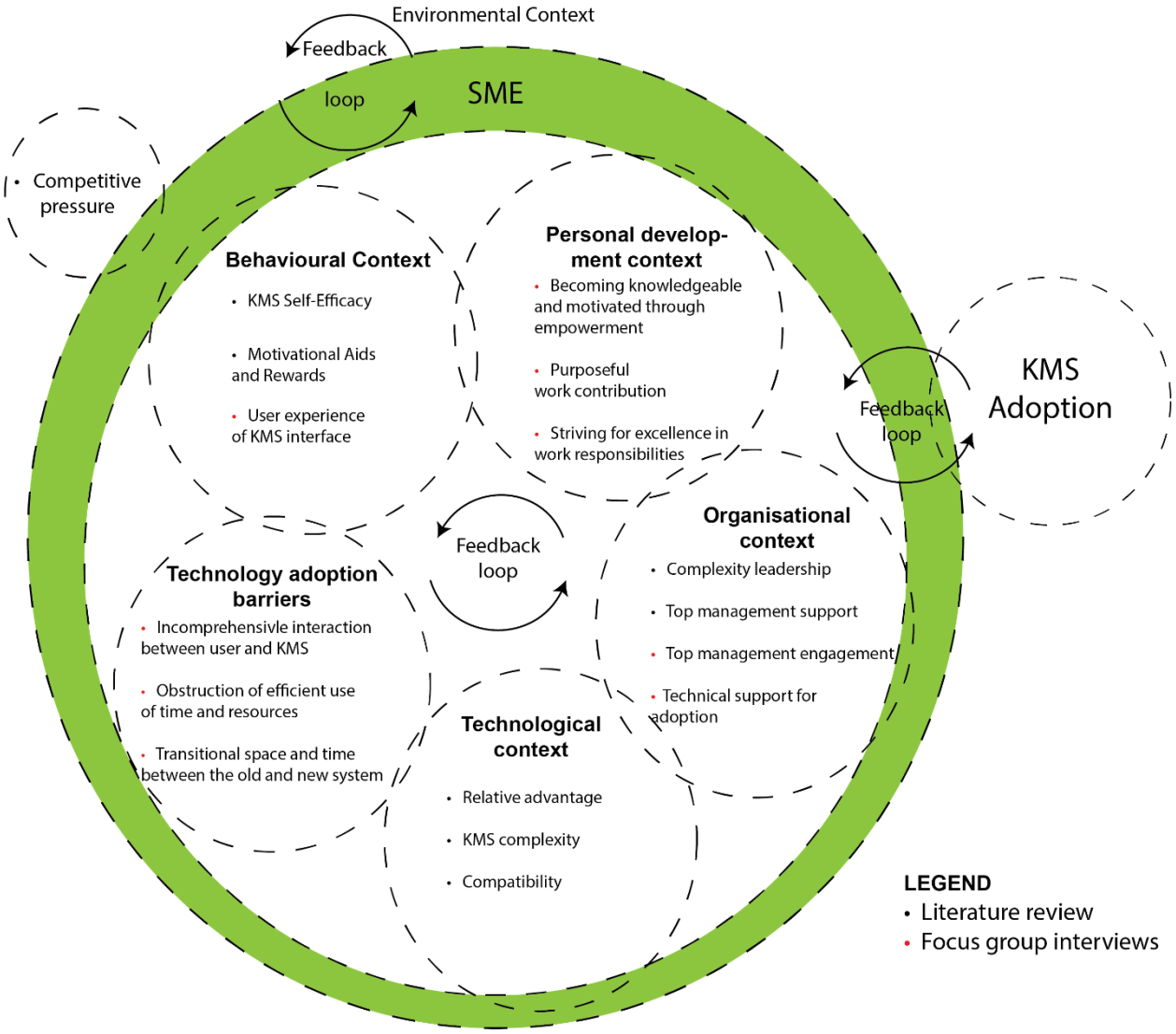

Figure 5.7: A systems-based view of KMS adoption in SMEs (Source: Researcher's own)

Inhibitory and reinforcing feedback loops exist primarily at three locations in the framework. Firstly, feedback loops exist between the relevant contexts to influence adoption at different magnification levels (e.g., behavioural or environmental). Secondly, there is a relation between the environment and the SME (containing the various contexts). Thirdly, there is an interplay between the (external) environment and the SME and adoption. Within the open system and the feedback loops exists the implied concept of synergy, which is depicted as the overlapping boundaries between the different contexts. Each element is dependent on the other elements spatially and temporally. Synergy also signifies that the sum is greater than the parts to give rise to new, adaptive qualities not present at lower levels of investigation.

Elements in a CAS are self-organising. Self-organisation implies that, for instance, appropriate support/ engagement from top management with users and stakeholders can influence elements (i.e., employees) in such a way that they can spontaneously reorganise to maintain order in the face of change.

Consequently, the theoretical framework has been placed in the context of KMS adoption, and the relevance of the themes were discussed. In essence, the greater the expected effort for adopting a system, the less likely it is to be adopted. Thus, the task and effort required to activate the task must be aligned (Halawi, McCarthy & Aronson, 2017).

Top management support is one of the most critical success factors for information systems, with KMS adoption models frequently referring to this fact (Al Haderi, Rahmin & Bamahros, 2018; Khayer, Talukder, Bao & Hossain, 2020). Close involvement by top management with users to hear their concerns should reduce KMS resistance. It can be obtained through Technical support to users in the form of manuals, workshops, or training on the KMS (Bhattacharya & Wamba, 2018).

Employees must undertake meaningful, purposeful work (Valmohammadi & Ghassemi, 2016). In classical technology adoption models, such as those by (Venkatesh, Think and Xu (2012), the effect of intrinsic motivation plays in user experience. User involvement and motivation are required to make the KMS useful and ensure knowledge transfer to the KMS (BenMoussa, 2009). User involvement has been included in KMS adoption models and CSFs for adoption, while involvement may motivate a greater desire for effort (Gefen & Reychaf, 2010).

Users felt they wanted to perceive the KMS as enabling users to make more efficient use of their time and resources (BenMoussa, 2009; Kuo, Lai & Lee, 2011; van Offenbeek, Boonstra & Seo, 2013).

Since the SME's internal environment is open to the external environment as a result of operating in an open system, there is constant flux of information and resources between the SME and the external environment.

The following section describes the findings from the one-on-one interviews with subject matter experts as part of the validation of the integrated literature and mini focus group interview data.

5.10. Contextualising the findings from subject matter experts

The researcher conducted all six interviews face-to-face or using teleconferencing software (e.g., Zoom). In addition, the study arranged for a suitable time and location for the interviews to minimise possible disturbances or interference by external factors. As a result, all experts were eager to share their knowledge with the study, which simplified discussing certain areas in greater detail.

5.11. Findings from Subject matter experts in the field

The subject matter experts held a variety of roled, but were all responsible for the adoption of KMSs and has had at least five years experience in this field. Table 5.10 illustrates the profile of the experts. Ages ranged between 30-59.

Table 5.12: Subject matter expert profile

Participant	Role	Age
1	IT implementation onsultant	50-59
2	Business analyst	30-39
3	IT manager	40-49
4	IT manager	30-39
5	Solutions architect	40-49
6	Principal consultant	50-59

Before the themes are discussed, comments made during the interviews about complex adaptive systems without prompts by the study are worth noticing. Living systems are a type of CAS - an organic living system based on principles in complexity theory. The living system paradigm differs significantly from the mechanical machine metaphor used since the Newtonian and industrial eras. Experts referred to the KMS as a living system instead

of a mechanical ‘cog in a wheel’. The researcher affirms the living system metaphor through the theoretical framework of this study. Subsequently, a KMS is a constantly evolving system which needs to be updated to adapt to a changing internal and external environment. For instance, the several contexts internal to the SME feed back into the external environment and from the external environment into the SME. As a result, for example, reducing technology adoption barriers may increase the adoption of the KMS, which may lead to increased competitiveness, which leads to a higher likelihood of competitors also adopting a KMS. Adoption of a KMS is, however, not guaranteed. If the competitor’s internal environment is not conducive to adoption of the KMS, efforts can recoil, resulting in even poorer performance.

> *E4: “It is more like an organism.”*

> *E5: “These are learning management is a living system, so it’s gotta be updated, it’s gotta be maintained, and people have to be using it.”*

Following are themes which emerged from the analysis of the subject matter expert interviews.

5.11.1. Product champions

It was recognised that there needs to be a person or a group of people who should be held accountable for taking charge of the adoption process, often known as ‘product champions’ or KMS champions. The ‘product champion’ should drive the organisation's new innovation and technology needs as required while also being endowed with the appropriate incentives (see the human behavioural context). The responsible person(s) should inform prospective users of the impending change and motivate users about the positivities of the new KMS. Unfortunately, the study did not find references to product champions in the KMS literature.

> *E1: …you may want to talk about KM champions or advocacy even in the organisational context. … I’ve seen that the best people to actually champion an*

advocate for KMSs are actually at operational level because they spearhead, and they talk about the system and they actually use the system…

E5: Yes, that would be a great example of somebody there. So, I would love that. '...you need that techie on the road contact with those champions, the processes that you build ownership with."

E3: "Because part of that [adoption process] is identifying who the champions in the business are."

5.11.2. Organisational culture (f=14)

Organisational culture has often been pointed out as a determinant of KMS adoption (Shrafat, 2018). Memon, Sayed and Arain (2017: 38) define organisational culture as "the core benefits; values, normal, and social customs that govern the way individuals act and behave in an organisation." Implementing a knowledge management system while achieving organisational objectives requires an organisational shift toward embracing knowledge-based activities, which include knowledge-based work for employees. In addition, it means promoting knowledge sharing and creating value in the organization (Poul, Khanlarzadeh, Simiei, 2016).

An optimistic organisational culture is one of the most important critical success factors for knowledge management, specifically where the organisation supports learning, sharing and using knowledge (Senuse, Qodarsih, Lusa & Prima, 2018; Zarilla, Ismail & Rosman, 2022). Wong and Aspinwall (2005) identified organisational culture as the second-most important CSF in SME KM processes, asserting that it is more important than implementing KM technology.

Organisational culture can have an important impact on KM initiatives and may ultimately affect the outcome of KMS projects aiming to engender the adoption of the KMS in the organisation (Saleh, Abdelrahman, Skoumpopoulou, & Wood-Harper, 2017). In a review by Shrafat (2018) regarding KMS adoption in SMEs, organisational culture was identified as part of the five factors constituting the model. Therefore, it seems a top priority for KM

to succeed. Several cross-cultural studies have highlighted the links between IT and organisational culture.

Furthermore, organisational culture emerged as a success factor without being stated explicitly, as was found in a literature review of CSFs over a two-decade period by Saleh, Abdelrahman, Skoumpopoulou and Wood-Harper (2017). Given the abundance of research indicating the importance of taking organisational culture into account when introducing an IS, it is surprising that there has been a lack of research on the role of SME organisational culture. For example, Dei's (2017) Delphi study also identified organisational culture as a significant factor in KMS adoption.

Therefore, in-depth interview data allowed the study to identify the role of culture in the KMS adoption process. It was evident from the discussions that the role and policies of leadership and top management support directly influence KMS adoption at the user level. Two experts mentioned culture explicitly as playing a role in ensuring adoption.

> *E4: I would definitely investigate the cultural component, and I would build in a team-based view.*

Seeing both a need for organisational culture and product champions, one expert commented,

> *E3: And then you've got to build a culture of change, a culture of adoption, a culture of innovation, then you've got to identify people in the business who aren't executives that actually do work that are excited.*

5.11.3. Purpose (f =26)

Strategy and purpose clarify the organisation pursuing KM to become a knowledge-based organisation. The strategy further provides value for all employees in the organisation to collaborate on the SME's vision (Dalota & Grigora 2010).

Furthermore, strategy and purpose provide a stable foundation for the organisational deployment of resources and capabilities to achieve KM goals. However, this can only happen if top management supports the goal. Therefore, employees should believe in the purpose and goals as part of the KM efforts, with clear objectives guiding the way (Saleh, Abdelrahman, Skoumpopoulou, & Wood-Harper, 2017).

It became clear that SMEs must have a clear goal and purpose as a strategic success factor (Sensuse et al., 2018). Likewise, users must have meaning and purpose to engage in their work (Egwunatum, 2022). The organisation requires a purpose or goal to understand the role(s) of the KMS and how it will assist the organisation in where it needs to go. On the question, 'If you were to use this framework to implement company strategy, what would you use?' An expert observed several themes that the study ultimately identified:

> *E5: For me, it's that cycle. You set the goal, you set up the leadership to support the goal. You build ownership across the business, and then you do ongoing training.*

Integrating the end state with culture and technological context, another respondent noted:

> *E3: You have technological requirements that you've got to meet to get to that end-state, and you've also got cultural requirements. What is that going to take?*

Similar to the theme of purposeful work contribution identified by the mini-focus groups, the purpose was not explicitly identified in the KMS literature.

5.11.4. Team-based perspective (f= 7, 2 respondents)

As has been alluded to, the study added individual behavioural elements to the TOE, catering to a 'lower' level of investigation for factors affecting adoption.

Emphasising a combination of culture and a team-based view:

E4: The team element and how a team engages with knowledge is something… I would definitely investigate the cultural component, and I would build on a team-based view.

The team-based view implies that teams form the link between individual behaviour (behavioural context) and the organisational context (encompassing the organisation's behaviour as a whole). However, limited reference has been made to a team-perspective in the KM literature. Nonetheless, a team perspective has been proposed in the form of a teamwork culture. Being cognizant of an employee's need to be involved in teamwork can motivate them to create and share knowledge (Karami, Alvani, Zare & Kheirandish, 2015).

5.11.5. Technical skills & knowledge (f= 2, 1 participant)

Whereas technical support in this study refers to the availability of all necessary training resources for the KMS, technical skills refer to the training and awareness users require to be considered competent in using the KMS. As Wang (2019: 5555) states, "to realise benefits from knowledge sharing or transfer, knowledge recipients need to become aware of the available knowledge, adopt it and implement it. However, all too often, knowledge sharing or transfer benefits are not realised because knowledge recipients are unaware of the existence of knowledge or fail to grasp its values".

Technical skills can be acquired through individual/ group instructors, online tutorials and forums with question-and-answer sections. Users need to be skilled in the system's applications before using them.

Adding to the technical support theme mentioned by the focus groups, an expert mentioned the cognitive and physical skills required to use the KMS. In an e-learning context, without technical support, it was found that it led to frustration and a lack of future intention towards use. Therefore, at least some technical support must be accessible to the KMS user. Fleming, Becker and Newton, 2017) agreed that technical support must be accessible to the user through training, training manuals, workshops and the like.

Acknowledging the complexity of adoption and the plethora of success factors implicated in SME adoption accomplishment, Rodrigues (2021) also pointed out that tangible resources, such as skills and capabilities, facilitate SMEs' success.

> *E3: I almost want to say 'technical awareness or 'technical know-how'... 'So, the people know what to do, technically. That is important, yes.*

Shrafat (2018) empirically verified the relationship between IT capabilities, organizational culture, sharing, learning, and the adoption of KMSs and found that all constructs influence the adoption of KMSs except organizational culture.

Information system utility, motivation and user involvement are required for knowledge transfer (Gefen & Reychaf, 2010). In addition, various KMS models have pointed out user involvement as a critical success factor in adoption, with greater involvement leading to increased effort (Khayer, Talukder, Bao & Hossain, 2020).

The theoretical paradigm of this research informs the design of Figure 1. SMEs exist as part of an open system, experiencing a constant flux of information and resources, which affects adoption. Feedback exists primarily between three different contexts to reinforce or weaken signals from the system. Firstly, between the SME and the external environment; secondly, between the different contexts within the organisation; and thirdly, between the SME and KMS adoption. These three feedback loops simultaneously inhibit and enhance each other to increase or diminish the adoption of the KMS. Interdependence describes openness and feedback where intra-organisational contexts (e.g., technological and personal development) reciprocally influence and enhance each other.

Without awareness and knowledge of using the KMS, adoption will, at best, be resisted. But, on the other hand, by exploiting IT applications, KM processes can be encouraged (Shrafat, 2018). Findings were insightful in that recommendations and suggestions overlapped, while some comments pointed to unique additions to the framework.

When prompting experts whether they would recommend adding or deleting factors from the framework, none recommended so.

In sum, experts agreed with the factors in the framework

> *E4: "No. I don't think we should take something away. There is not something that tells me to remove something."*
>
> *E6: "I would definitely have the technological and organisational contexts. Definitely behaviour for user experience. Personal development it's also important, but for a small organisation, I wouldn't be too strict on that."*
>
> *E5: "So, at a high level, I feel this covers everything that I would be looking for in such a model."*

This research originates from the knowledge management field regarding the adoption of KMSs. Despite technological advances which improved IT usability to make it more accessible, KMS failure rates of ISs have remained high.

Figure 5.8 below illustrates a systems-based view of KMS adoption in SMEs from the themes identified in the focus group interviews. To expand on Figure 5.7, the themes (blue) which emerged from the subject matter expert interviews are indicated as having a reciprocal effect on KMS adoption. The themes which were identified were Product champions, Organisational culture, Purpose, Team-based perspective and Technical skills and knowledge. For example, an SME with an Organisational culture conducive to the practice of capturing, storing and disseminating organisational knowledge might also appoint a dedicated employee to oversee KM practices, thereby improving KMS adoption even further.

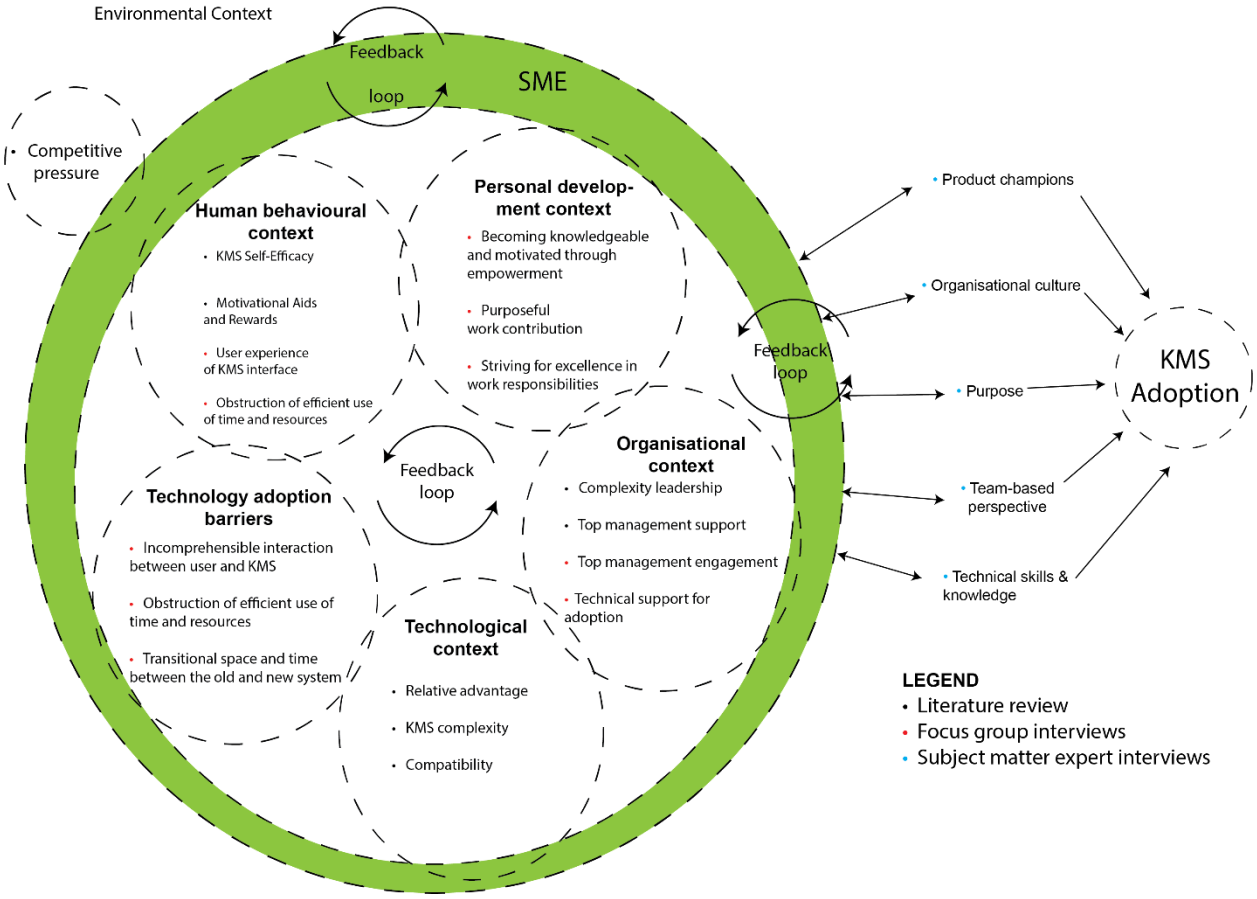

Figure 5.8: An integrated complex-system perspective on KMS adoption in SMEs (Source: Researcher's own)

5.12. Aligning the findings with research objectives

This section delineates the outcomes of the findings through the 2-phase interview process with the objectives set out in the study.

Theoretical objective 1 (TO1) set out to identify concepts from the CSF literature as it relates to KMSs. It was found that leadership, top management support, organisational culture and motivational aids and rewards play a significant part in the KM processes and, therefore, KMS adoption.

TO2 aimed to compare the concepts of KM adoption models with concepts of CSFs. Table 5.4 below outlines the concepts as identified in the KM adoption models accompanied by the CSFs where appropriate. The concepts identified from the KMS and CSF literature were based on a summary of the literature. For ease of reference, the most prominently cited literature consulted were included. Inclusion of a concept was based on frequency as well as the justification by reserachers and the context in which the concepts were found to be significant.

Table 5.13: Comparison between proposed KMS model concepts and CSFs

Concept	Proposes KMS Models	CSFs
Top management support	Al-Busaidi & Olfman, 2005; Kaldi, Aghaie & Khoshalhan, 2008; Lin, 2013; Tsai & Hung, 2016; Wang & Wang, 2016	Akhavan & Zahedi, 2014; OuYang, Yeh & Lee, 2010; Rao, Nandini & Zachariah, 2022; Saleh et al., 2017; Sensuse et al., 2018; Wong & Aspinwall, 2005.
Leadership	Dei, 2017; Al-Busaidi & Olfman, 2005	OuYang, Yeh & Lee, 2010; Rao, Nandini & Zachariah, 2022; Saleh et al., 2017; Sensuse et al., 2018; Wong & Aspinwall, 2005.
Motivational aids and rewards	Al-Busaidi & Olfman, 2005	Akhavan & Zahedi, 2014; Sensuse et al., 2018; Wong & Aspinwall, 2005

Concept	Proposes KMS Models	CSFs
Training	Lin, 2013; Oumran et al., 2021	OuYang, Yeh & Lee, 2010; Saleh, et al., 2017; Sensuse et al., 2018
Organisational culture	Al-Busaidi & Olfman, 2005; Dei, 2017; Shrafat, 2018	Akhavan & Zahedi, 2014; Brandin & Sterner, 2020; Rao, Nandini & Zachariah, 2022; Sensuse et al., 2018.
IT (infrastructure)	Al-Busaidi & Olfman, 2005; Dei, 2017; Oumran et al., 2021; Shrafat, 2018; Tsai & Hung, 2016	Akhavan & Zahedi, 2014; Saleh et al., 2017; Sensuse et al., 2018.

TO3 aimed to describe selected concepts from complexity theory as they relate to the study. The study's theoretical framework suggests that organisations possess characteristics of a CAS. The identified concepts were as follows: openness refers to the continuous flow of information and resources into and out of the SME from the external environment. The SME never exists in a vacuum free from outside influences. Feedback loops emphasise the continuous influence between the external environment, the SME, the SME's respective contexts and the adoption of the KMS). Self-organisation highlighted the role of elements within a system in creating global order without outside influence. This behaviour pattern is illustrated in an SME's ability to re-establish order in the face of KMS resistance or rejection by users. When organisational elements self-organise to produce phenomena on a global scale not visible at local levels, it is known as emergence. It was shown in a KMS context that emergence occurs when elements interact for KMS adoption to emerge. In addition, order within a system (i.e., the organisation) occurs when the SME is in a paradoxical state of bounded instability "far from equilibrium". The concept of synergy implies that the whole is more than the sum of the parts. In a CAS, the whole is greater than the sum of the parts (Gharajedaghi, 2011). Therefore the influence of each element is dependent on each of the other elements in that system.

TO4 aimed to construct a preliminary theoretical framework using the TOE framework, DOI model and CSF literature. It was achieved through the construction of a preliminary

theoretical framework for the adoption of KMSs in SMEs using the Technology-Organisation-Environment (TOE) framework, Diffusion of Innovation (DOI) Theory and critical success factors (CSF).
Similarly, empirical objective 1 (EO1) investigated differences in adoption factors and CSFs regarding KMS adoption. Several studies have been published detailing many CSF for adopting various technologies, such as cloud computing, enterprise resource planning and e-business systems. The study found that leadership and top management support, motivational aids and rewards, and self-efficacy were the most significant CSFs based on the mean score awared by an SME and so-called “contributors” (academics, consultants and practitioners to the factors.

EO2 aimed to describe the influence of KMS self-efficacy on KMS adoption in SMEs. Although differentially conceptualised in the IT adoption literature since Davis’ (1986) TAM, the perceived usability of IT systems has shown to be an important determinant in IT adoption. The influence of self-efficacy was found to be influential in KMS adoption.

EO3 aimed to describe the influence of managerial and leadership behaviour on KMS adoption in SMEs. The most consistently published findings in the IT adoption literature referred to top management support and leadership. In aligning leadership with the study's theoretical framework, leadership was conceptualised as complexity leadership. Both top management support and leadership were also indicated CSFs in the literature.

EO4 aimed to determine the influence of technological factors on KMS adoption. The DOI played an instrumental role in achieving this objective. The identified technology factors form part of the DOI, as Rogers (1995) described, namely relative advantage, complexity (conceptualised for this study as KMS complexity) and compatibility.

Within the theoretical framework of complexity, the influence of the external environment on KMS adoption was an apparent objective. Therefore, EO5 described the influence of the environment on KMS adoption in SMEs. The findings identified competitive pressure as a consideration for KMS adoption.

EO6 was established by constructing a final framework for adopting KMSs for SMEs. It was achieved by integrating the findings from a review of the relevant IT adoption literature with the interviews from the mini-focus groups and subject matter experts. The final framework is illustrated in figure 5.8. Table 7 below summarises how the findings align with the study objectives.

Table 5.14: Demonstration of how research objectives were addressed in terms of literature, mini-focus group, and subject matter interviews

DEMONSTRATION OF HOW RESEARCH OBJECTIVES WERE ADDRESSED I.T.O. LITERATURE, MINI-FOCUS GROUP AND SUBJECT MATTER INTERVIEWS					
NO	**RESEARCH OBJECTIVE**	**LITERATURE**	**FOCUS GROUP INTERVIEWS**	**SUBJECT MATTER EXPERTS**	**ANALYSIS**
1	**Theoretical objective 1 (TO1)**: Identify concepts from critical success factors (CSFs) literature as it relates to KMSs.	Motivational aids and rewards. Complexity leadership. Top management support. Organisational culture.	Technological support for adoption. IT Infrastructure.	Purpose. Top management engagement. Technological skills and knowledge (training).	It can be concluded that management should, together with good leadership, create a culture where using the KMS is expected and encouraged through appropriate rewards and incentives.
2	**Theoretical objective 2 (TO2)**: To compare the concepts of KM adoption models with CSFs concepts.	Top management support. Leadership. Organisational culture.	The focus groups did not specifically compare the CSF in terms of KM adoption models.	The subject matters did not specifically compare the CSF in terms of KM adoption models.	It can be established that since top management support and leadership were seen as common factors, they are vital towards the success of KMS adoption.

3	**Theoretical objective 3 (TO3):** To describe selected concepts from complexity theory as they relate to the study.	Open systems. Self-organisation. Feedback loops. Emergence. Homeostasis: "far from equilibrium." Synergy.			It was established that these concepts from complexity theory are a satisfactory mechanism for describing KMS adoption as a complex adaptive system. It provides a framework for explaining and describing KMS adoption in a complex, dynamic environment.
4	**Theoretical objective 4 (TO4):** Construct a preliminary theoretical framework for the adoption of KMSs in SMEs using the Technology-Organisation-Environment (TOE) framework, Diffusion of Innovation (DOI) Theory and Critical success factors.	Figure 9 in Chapter 5			It was established that the TOE framework and DOI theory provide a robust, holistic framework for the further development of a framework for KMS adoption.
5	**Empirical objective 1 (EO1):** To investigate differences in adoption factors and CSFs regarding KMS adoption.				

6	**Empirical objective 2 (EO2)**: To describe the influence of KMS self-efficacy on KMS adoption in SMEs.	Self-efficacy.			It was established that limited reference was made to self-efficacy in the KM literature, even though self-efficacy has been shown to play an important role in improving KMS adoption by improving beliefs related to competence.
7	**Empirical objective (EO3)**: To describe the influence of managerial and leadership behaviour on KMS adoption in SMEs.	Top management support. Complexity leadership.		Top management engagement.	It was established that top management support, engagement and complexity leadership play a vital role in adoption as part of an organisation context
8	**Empirical objective 4 (EO4):** EO4: To determine the influence of technological factors on KMS adoption.	Relative advantage. Compatibility. Complexity.	Incomprehensible interaction between the user and KMS. Obstruction of efficient use of time and resources. Transitional space and time between the old and new systems.		It was established that the effect on time and the availability of resources not mentioned in the literature play a vital role in user adoption efforts.
9	**Empirical objective 5 (EO5):** To describe the influence of the	Competitive pressure.			It was established that the external environment has a significant effect on the

	environment on KMS adoption in SMEs.				adoption of a KMS through the availability of other KM systems from competitors
10	**Empirical objective 6 (EO6):** EO6: To construct a final framework for the adoption of KMSs by SMEs.	Figure 8 in Chapter 5			It can be concluded that the final framework provided a holistic account of the literature and interviews for KMS adoption

6. CHAPTER 6: CONCLUSIONS AND IMPLICATIONS

This chapter presents a consolidated summary of the research findings concerning the research question and objectives, including the value and contribution thereof. The chapter will also examine the limitations and directions for future research.

6.1. Introduction

The study aimed to develop a knowledge management system adoption framework for small and medium enterprises (SMEs). In so doing, a preliminary theoretical framework was developed based on the appropriate literature. From this, four mini focus group interviews augmented the framework by identifying patterns of meaning (themes) from the data. The second phase of six personal face-to-face interviews was conducted with six subject matter experts as part of the validation process. The findings yielded additional themes which were added to the framework.

6.2. Conclusions

This section elucidates the conclusions from the various sections of the study.

6.2.1. Conclusions of the theoretical objectives

This section details the conclusions from the theoretical objectives

Conclusions from the systematic literature review

Ultimately, the adoption of an information system happens at the individual level, where the user engages with a system (or not). A human behavioural context was added to the TOE framework to acknowledge the role of human factors in KMS adoption. In particular, two factors were added: self-efficacy and motivational aids and rewards. The former conceptualised as KMS self-efficacy, emphasised the role of users' belief in themselves to adopt a KMS. Self-efficacy will thus influence a user's motivation, endurance, and determination. It implies that users with a higher KMS self-efficacy will be motivated to pursue competency and adoption more consistently in the KMS, particularly when the

KMS can help the user solve a business problem. In addition, self-efficacy helps a user gain an attitude towards adopting the KMS. The higher the self-efficacy of a KMS, the less motivation a user will require in the form of external rewards. Conversely, when the user is motivated and rewarded to adopt the KMS, this may lead to a greater belief in adoption.

The factors identified under the technological framework were acquired from the Diffusion of Innovation Theory. The more a KMS is perceived as an improvement from the previous KMS utilised by the user, the more likely the current KMS will be adopted. Users (employees) with finite time and resources will be more incentivised to use the KMS if their efficiency and effectiveness increase to address their task responsibilities. The inability to understand a system (i.e., complexity) means that KMS users will resist adopting the KMS and resort to an alternative measure of accomplishing their tasks, taking up disproportionately more time.

As part of the technological context, two factors that were added to the theoretical framework and found to play a role in KMS adoption and the ICT field, in general, were top management support and complexity leadership. However, these factors in and of themselves do not guarantee adoption. With sufficient top management support and leadership, employee and managerial adoption of the KMS will be enhanced. Management and leadership should also ensure a clear vision for implementing the KMS and that users receive the necessary support. Conversely, lacking support or leadership may result in a lack of KMS adoption.

The influence of competitors in the external environment should not be underestimated. Pressure from competitors in the industry may force an organisation to adopt a KMS at a rate not conducive to their current internal IT systems. Conversely, it may force an organisation to adopt a KMS to remain more competitive with its competitors.

The preliminary theoretical framework originated from the relevant literature and served as a signpost for SMEs wanting to adopt KMSs. The TOE framework was augmented by

including critical success factors, which may directly or indirectly influence KMS adoption through the interaction of these factors.

The theoretical framework for the study was based on organisations as complex adaptive systems. However, as illustrated in Figure 5.8, several features of a CAS are prevalent in KMS adoption. These features are listed below.

- Feedback loops: Loops can either reinforce or inhibit specific patterns of effects, such as the effect's influence on the external environment leading to improved adoption behaviour.
- Open systems: The organisation is conducive to external influences through a flux of information and resources into and out of the organisation
- Synergy: Interdependence between interrelated factors. The influence of one factor will necessarily influence another factor to either reinforce or inhibit the adoption of the KMS.
- Emergence: The self-organisation of factors leads to outcomes greater than the sum of the parts. In this context, emergent behaviour is the users' adoption of the KMS.
- Self-organisation: The process which occurs in a system as a result of local interactions without the need for outside influence, as can be the case when technological support increases self-efficacy.
- Homeostasis: “Far from equilibrium”: For a system to be in a state of homeostasis, it must exist between a state of order and disorder, at ‘the edge of chaos’. A state of bounded instability engenders dynamic interaction between order and disorder (Stacey, 1992; Turner & Baker, 2019).

Conclusions from the empirical objectives

How a user experiences the KMS may influence the value they perceive to derive from the KMS. The theme pointing to a User experience of the KMS interface highlighted the importance of the KMS interface in meeting users’ needs through a deep understanding of user behaviour, their needs, what they value and their perceived limitations.

Two additional contexts were added to the framework: a Personal development context barrier and a Technological adoption barrier context. The former context emphasised the need for users to master their tasks and responsibilities. The latter emphasised factors that may impede adoption efforts by decreasing a user's efficiency or effectiveness, primarily in time and a lack of resources. The KMS should be designed so as not to obstruct the user's progress towards a particular goal. KMS features not conducive to task completion may reduce the adoption of the KMS.

Furthermore, management should ensure sufficient support structures before moving toward a newer KMS. Abrupt changes to the system or the sudden introduction of a new system could potentially derail efforts to improve adoption. Instead, a transitional space should be created for a sufficient period for users to habituate to the new system. Users should be given sufficient time to adjust to the new system. Ideally, the features and benefits of the KMS should be communicated well in advance with users to provide them with sufficient time and the requirements to adopt a system.

Users tend to need purpose and mastery in their responsibilities. Mastery is a "display of great skill or technique" (Merriam-Webster, 2022). Therefore, management must provide a clear vision and the requisite information and skills in the work environment.

Appropriate technical support for adoption means that users have the necessary training and materials to use the KMS to its full potential. As illustrated in one of the focus group interviews, when a participant was not appropriately trained on the full functionality of the KMS, it resulted in a financial expense to the organisation and a more burdensome, protracted process. Therefore, management should provide leadership and support with a clear vision and be engaged with users 'on the ground' to identify their needs, identify areas of concern, and determine how adopting the KMS will influence their work activities. In addition, technical skills are likely to provide users with the self-efficacy to utilise the KMS. So it happened that users could be concerned that using the KMS may affect their ability to get their work done, while the necessary support from management to take ownership of the adoption process might alleviate the resistance that goes with it.

An organisation with a positive orientation towards knowledge management enables employees' willingness to contribute (share, store and retrieve) their knowledge and ideas. On the contrary, an organisation with rigid structures and lacking trust and

innovation may stifle KMS adoption. By appointing product champions to take charge of the adoption process among users, users can simultaneously be motivated, appropriately incentivised, and provided with a greater purpose and direction.

6.3. Limitations

6.3.1. Limitations of the Literature Review

Two limitations have been identified as part of the literature review. First, the review included literature on studies conducted on several types of technological adoptions, such as cloud computing, ICTs, ERP and CRM systems. Since KMSs have been differently defined in the literature, users' adoption propensity may differ despite a considerable overlap between these systems.

Some of the factors were more applicable to non-SMEs. Therefore, although there is considerable overlap, it is recommended that future studies focus more on SMEs, specifically when reviewing other factors more specific to KMSs.

6.3.2. Limitations of the empirical study

A limitation of the study was the skewed distribution between men and women in the sample. Therefore, it is recommended that future research studies select an equal representation of men and women from a larger sample of a particular population.

Future research could examine potential differences and similarities between industries and sectors in KMS adoption as some sectors and industries (service industries, such as consulting organisations) rely more on intellectual capital than major industries reliant on natural resources.

The SMEs were recruited from the Gauteng province in South Africa. Therefore, the findings do not necessarily reflect adoption trends in the rest of South Africa. A sample might also be recruited from the entire South African population, given that different provinces in South Africa have various socio-economic statuses, with particular population groups having less access to technology.

All data were coded, categorised and theorised into themes by the study. Researcher bias could have affected the themes identified by the study; therefore, the findings should not be directly extrapolated to other contexts,

Some themes were not consistent with findings from the literature. Future research may identify overlapping themes within the literature. As these findings were based on SMEs, the value of these findings to large organisations could pose limitations. Future studies might investigate similarities and differences between the identified KMS adoption factors and larger organisations.

Another limitation is that the research did not focus on a particular industry or sector of SMEs in the economy. Future studies could focus on a specific industry or sector in the economy for data collection and analysis.

A relatively small sample was collected for the personal face-to-face interviews. Future studies could increase the generalisability of the findings by increasing the sample size. Lastly, since the data was collected cross-sectionally, the adoption process was only investigated within a particular period from May 2021 – 30 Aug for focus groups, and April 2022 – 30 June 2022 for the subject matter experts. Therefore, it is suggested that a longitudinal study be conducted to expand the picture of KMS adoption factors.

The lack of initial experience by the study in conducting interviews admittedly contributed to gaining an incomplete picture from participants in terms of guiding the discussion for additional information. Furthermore, budget constraints and lack of capacity limited the time available to interview more participants.

6.4. Evaluation of the study

This section highlights the contributions of the study.

6.4.1. Contribution at a theoretical level

Contributions were made on several fronts: The adoption of KMS models is limited, especially concerning SMEs, and for this reason, the data collection focused on SMEs.

The behaviour context of KMS adoption lacked deep insight, as it was not included in TOE frameworks or DOI theory before. Therefore, this context was included in the study. The research findings indicate that Behaviour is a crucial CSF in technological adoption, explicitly focusing on KMS adoption.

Two additional factors as part of the organisational context have been identified. First, Top management engagement, encompassing a more hands-on approach by top management. Secondly, the literature did not explicitly mention Technological support for KMS adoption.

The subject matter experts contributed as co-creators to the final framework. The Team-based perspective linked Top management and the Individual level of adoption. The researcher found themes, including Product champions, Purpose, and Technological skills and knowledge, not consistent with the literature findings but contributed significantly to integrating the roles of some factors with others, as in the case of Top management support (at an organisational level) with top management engagement (at an individual level).

Chapter 2 referred to man's propensity to explain abstract ideas in metaphors. Historically, man himself – and processes were seen as mechanical – like a machine. The contemporary metaphor of today is one of complex adaptive systems (CASs), such as living systems. As illustrated in the final framework, these systems are defined by their openness of the SME to the external environment; feedback loops reinforcing and balancing causes; self-organisation of elements and contexts in a system; and synergy, to create a whole which is greater than the sum of the parts. Similarly, the metaphor of a microscope also referred to in Chapter 2 as a way of examining matter at different levels of organised complexity. CASs has, therefore, become a metaphor for contemporary organisations.

Finally, several inferences could be drawn through a complexity lens, not explicitly stated in the framework. One such example is the role of unintended consequences through positive and negative feedback loops. For example, teams and management might intend to improve KMS adoption among its members. Still, due to teams competing internally,

creating an increasingly competitive environment, adoption efforts are thwarted or fail outright.

6.4.2. Contribution at a practical level

The study made contributions on several fronts. Firstly, it identified CSFs relevant to KMS adoption. CSFs have been widely studied in the IS field but less so in KM. Secondly, a Human behavioural context was introduced to draw attention to the Individual-level behaviour required for adoption in the form of self-efficacy. Lastly, apart from the interviews augmenting the framework beyond the literature, the Personal development context and Technological adoption barriers provide two new contexts to be studied for KMS adoption. The former context offers a 'negativity bias' highlighting the inhibiting factors to KMS adoption instead of encouraging adoption to provide a more holistic picture of adoption.

Compared to previous KMS frameworks, this framework provides a more integrated, holistic picture framed by a complex theory framework.

Previous discussions of the TOE framework did not focus on the behavioural context. For this reason, the study contributed a Human behavioural context to the framework. Furthermore, although CSF has featured prominently in the KM literature, the integration of CSF with the TOE framework and DOI model was lacking. Therefore, the CSF provides more weight to the ideal factors to include as part of the TOE framework and DOI model.

Because organisations scale in a non-linear fashion, SMEs are not simply smaller versions of large organisations. The question, therefore, is how these findings are unique to SMEs. Self-efficacy is an individual behaviour which emphasises belief in their capabilities. For SMEs, a smaller staff complement means that one individual with low self-efficacy (and incomprehensible interaction between the user and the KMS) has the ability to influence the self-efficacy of a large proportion of the other employees. In addition, as the literature on SMEs have pointed out, leadership accompanied by top management support has been two of the most prominent factors in the referenced literature. In SMEs, where employees have limited guidance from middle management,

as would be the case in larger organisations, top management and leadership skills are of utmost importance to employees adopting technology.

In addition, SMEs have a general diminished access to resources compared to large organisations, thereby justifying the inclusion of some of the concepts in a framework for SMEs as opposed to a framework for large organisations. For example, top management engagement emphasises the personal nature of top management support, thereby focusing on the interdependence between top management and 'blue collar' employees that have to adopt the KMS as opposed to the hierarchical nature of large organisation with a greater physical and psychological distance between top and bottom employees.

SMEs imply a greater vulnerability to shifts in the environment. Therefore, SMEs need to put in place robust systems to exploit this vulnerability. As an example, organisational culture should include standard operating procedures for communication and the sharing of resources and information between departments and employees. Thus, dynamics in one department should not lead to the malfunction of another department.

6.4.3. Contribution at an empirical level

The study confirms previous findings in the literature on KMS adoption factors. However, the study also adds a Technological adoption barrier context and a Personal development context, challenging the literature. These findings are not consistent with the current literature on KMS adoption as the contexts do not appear to be conceptualised in the literature.

Overall, the existing technology adoption theory regarding CSFs was confirmed. Yet, the findings from the interviews also challenge many of the factors influencing KMS adoption, such as the Technological adoption barrier context (i.e., incomprehensible interaction between user and KMS, obstruction of efficient use of time and resources, and transitional space and time from old to new systems) as well as the Personal development context (becoming knowledgeable and motivated through empowerment, purposeful work contribution, and striving for excellence in work responsibilities).

6.5. Conceptual implications

A notable link exists between theory and the findings. The ease with which a user experiences and adapts to technology has been conceptualised differently in the different adoption models, such as Perceived ease of use and Perceived usefulness by Davis (1989). The themes User experience of the KMS interface specifically emphasised the usability of the KMS interface rather than the technology as a whole. The findings indicated that incomprehensible interaction between the user and the KMS emphasised the frustration and rejection potential due to a lack of understanding. According to the literature, Technological experience limits support during KMS adoption.

A total of five themes emerged from the focus group interviews that were inconsistent with the literature. The themes were Transitional space and time from old to new systems, Top management engagement, Becoming knowledgeable and motivated through empowerment, Striving for excellence, and Purposeful work contributions.

Findings from the subject matter expert interviews augmented the framework. Two themes, Product champions and Purpose, were inconsistent with the KMS literature. These themes should be explored further in future studies to determine their possible overlap or novelty in the research literature. Organisational culture indicates the role of management in cultivating fertile ground for the KMS to be implemented with a clear sense of Purpose to guide the use of the KMS. In addition, Technical know-how in the form of Technical skills and knowledge assists users when getting stuck, and their self-efficacy declines as a result.

6.6. Practical Implications

The efficient and effective use of time is a top priority for users to drive KMS adoption. It became evident from several emerging themes, including User experience of the KMS

interface, Incomprehensible interaction between user and KMS, Transitional space and time from the old to the new system and Technical skills and knowledge.

Several themes emerged not explicitly discussed in the literature. Top management engagement captures a more hands-on approach than Top management support to ensure users feel competent in adopting the KMS.

Overlap between factors identified in the literature and findings from the focus groups and the subject matter interviews support the CAS feature, Synergy. It is because synergy indicates interdependence between the different factors and themes and implies that one theme will necessarily influence the other. Therefore, it holds beneficial and detrimental consequences for KMS adoption.

For example, a product champion driving the adoption process requires know-how about motivating users and rewarding them appropriately, inspiring users to store, transfer and create value within the KMS through their work while contributing to the tasks of others. Consequently, users can have someone near them to look for guidance.

While rewards cater for motivation for adoption over a relatively short period and need to be regularly reinforced, the Purpose theme keeps users and management on course regarding the KMS' intended use. Product champions also need to have the ability to act as a link between the user and top management dealing with strategic issues.

Similarly, top management supporting the users can augment adoption by also learning to engage with users by listening to their concerns and asking probing questions about their experience with the KMS.

Several themes, either explicitly or implicitly, referred to the importance of the availability of time and resources. Participants were most often concerned with the new KMS not allowing users to be more productive than before the KMS was introduced. As previously stipulated by the "Obstruction of efficient use of time and resources" theme, the primary concern of users is the ability of the system to save the user time. Therefore, a key question for the SME in adopting the KMS is the extent to which the new system will be

able to save the time and resources of users relative to the old system or competitive offerings.

Organisational culture is an emergent phenomenon that does not wholly reside in any individual in the SME. However, when users become cognisant of the SME's typical values, beliefs and behaviours, the boundary conditions for expectations towards adoption can be established.
The theme related to Technological skills and knowledge has implications for cognisance and ignorance of the ‘how-to’ of the KMS. Sufficient technical skills and knowledge will allow users to store information correctly, retrieve information more efficiently and know what recourse to take should they get stuck. Furthermore, users can better deal with issues as they arise by being more fully aware.

A Team-based perspective ensures greater synergy between users and management since teams can take corrective action more efficiently, through feedback loops, without outside guidance. Yet should the KMS be resisted by a whole team, faster feedback to top management is possible, or the necessary corrective action within the group.

6.7. Conclusion

Eight propositions were formulated based on the systematic literature review and are graphically depicted in Figure 6.9 below: Ths figure is the same as Figure 3.5 but is repeated for ease of reference to illustrate the evolution of the preliminary theoretical framework to the final framework of organisations as complex adaptive systems.

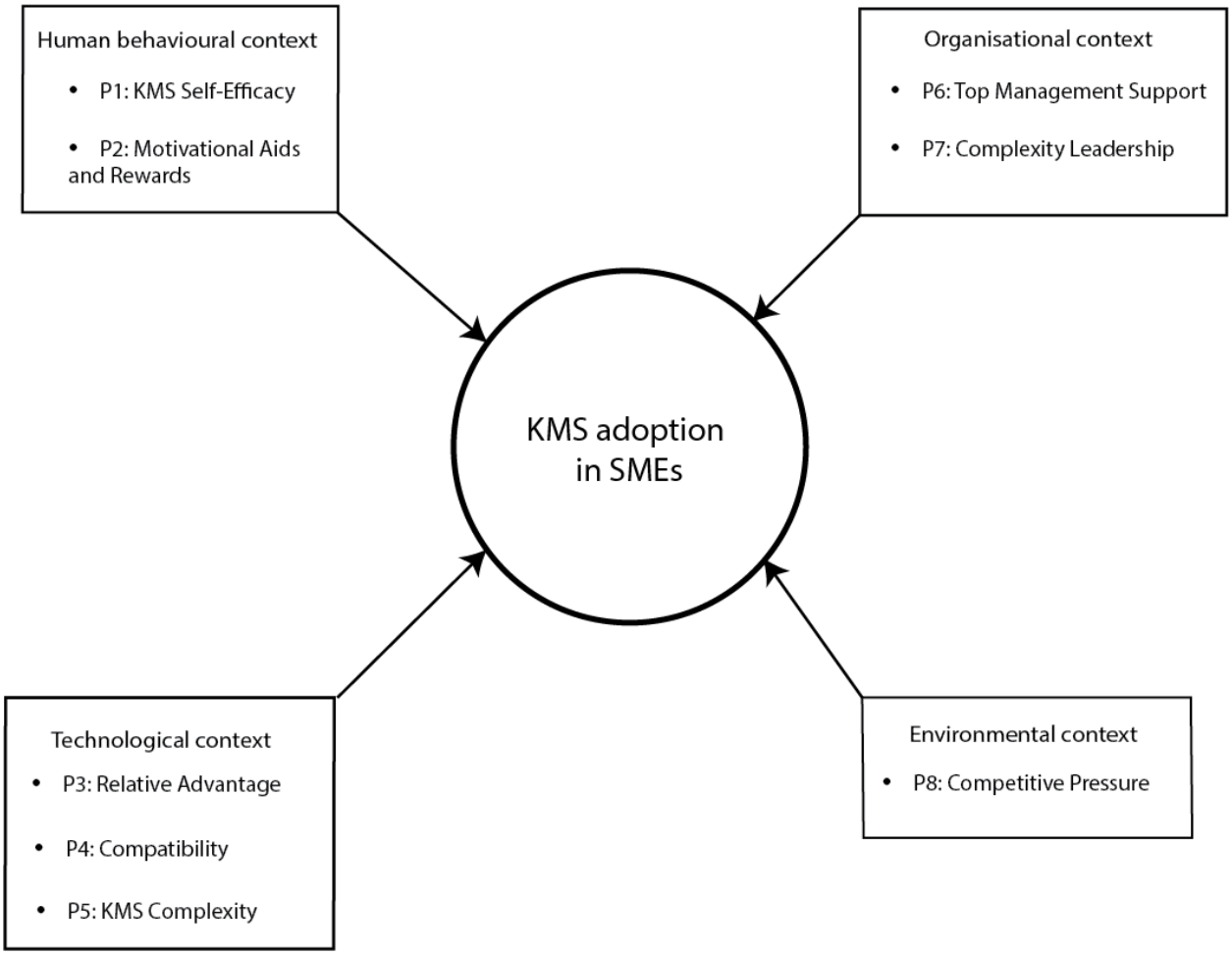

Figure 6.9: Conceptual framework of knowledge management system adoption in small- and medium enterprises (Source: Researcher's own)

This research provided perspectives on the possible interaction between KMS adoption factors in SMEs. However, the study focused on data collection in the province of Gauteng in South Africa. Therefore, the findings do not necessarily reflect the outcomes of other provinces, regions or countries.

Furthermore, a limitation of the study is the large number of factors identified as part of the framework, as no framework can encompass all factors. Future research may explore similarities and differences of factors within larger organisations, expanding on the framework or comparing this framework with other types of IT systems.

In addition, the themes were identified through an interpretivist paradigm using mini focus groups. The findings should, therefore, not be directly extrapolated to other contexts.

The findings of this study are consistent with other factors on KMS adoption, such as top management support and motivation and rewards. However, several ‘new’ themes were added to the framework, including Technical support for adoption and Top management engagement.

The small sample size implies that the framework could be applied to larger samples using SMEs or focus on specific industries or sectors.

The snapshot nature of cross-sectional data means that a longitudinal study could provide a more nuanced picture of KMS adoption since adoption is not necessarily a single event happening at a particular time.

6.8. Recommendations

Several recommendations have emerged from the literature review, mini focus group interviews and subject matter expert interviews.

The subject matter expert interviews improved the attributes of the entities in the framework. In validating the propositions in the framework, the study used a discussion guide and the developed framework to prompt participants. The findings are presented in Section 5.13. The following recommendations for KMS adoption in SMEs emanating from the research are as follows:

- Regarding User experience, the graphical user interface through which a user interacts with the KMS should be designed so that users find the KMS easy to use and functional. As a result, they should not experience any frustration using the KMS as it should provide an enjoyable and engaging experience.

- Top management should incorporate leadership and support in their KM strategy (e.g., through vision and mission statements). This intervention should be tied in with a greater sense of purpose of the KMS. In addition, Therefore, top management should work closely with KM users to ensure they have all the necessary resources to use the KMS and that the KMS aligns with their needs.

- Users should be motivated and incentivised to use the KMS through monetary or non-non-monetary means.

- Regarding skills and knowledge, management should ensure that users are sufficiently trained on the system. In addition, management should understand the implications of undertrained users and users who resist the KMS (to any extent).

- Regarding the availability of time and resources, management should provide sufficient resources and time for users to learn the system to acclimatise to the new system.

- The right organisational culture should be created by management to ensure that users know the correct norms and values and that these norms and values align with KMS adoption. It becomes particularly true when the organisation values excellence and purpose.

6.9. Chapter Summary

The study intended to develop a knowledge management system framework to improve adoption and mitigate adoption failure for small and medium enterprises. Furthermore, the study investigated why failure rates are still high despite numerous frameworks included in the literature explaining various information system adoptions and failures. These facts and findings ultimately led to restructuring and extending the framework for South African SMEs to focus on relevant contextual factors and improve adoption rates. The final framework was discussed and presented in Chapter 5.

The research established that KMS adoption is a multi-factor, multi-contextual phenomenon. Adoption is not a ‘one-size-fits-all’ approach and should not be treated as such. Sectors, industries, the organisational environment, the external environment, and the types of technology all play a role in user KMS adoption.

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8. APPENDIX A: DISCUSSION GUIDE – MINI FOCUS GROUPS

Participant Demographics

Time of Interview:

Date:

Place:

Time:

Interviewer: WR van Zyl

Position of interviewee:

Welcome:

Hi. My name is Werner van Zyl. I'm a doctoral student in knowledge management.

I'd like to thank you once again for being willing to participate in the interview aspect of my study. As I have mentioned to you before, my study seeks to understand why employees adopt/don't adopt the organisation's knowledge management system (KMS). The study also seeks to understand what factors drive this adoption/non-adoption of a KMS. The aim of this research is to construct a framework of KMS adoption so as to improve the adoption of an organisation's KMS. Our interview today will last approximately 45–90 min during which I will be asking you about your experiences with the KMSs, your reasons for using/not using the system and past experiences with the technology.

The nature of this discussion is such that confidentiality cannot be guaranteed, but where sensitive information is mentioned, it will be noted and deleted as part of the recording and audio transcript.

If you have a question, ideally put up your hand

You are able to contact me on 084 810 2274 or via e-mail after the interview should anyone have any questions.

If there's no further questions, then we can start.

Warm-up questions

1) How easy is it for you to adopt technology?
2) What do you understand under the term knowledge management?
3) Would you say it is important to adopt a knowledge management system in your work?

4) If you were to choose anything that will make you use the KMS more, what would it be?

5) What would motivate you to use the KMS less?

Self-efficacy

6) To what extent do you think a person must be capable of using a knowledge management system to adopt it?

7) What behaviour strengths/skills do you think an employee needs to have to adopt new technology or embrace change in the organisation?

Motivational aids and rewards

8) What role do you think motivation and rewards play in adopting a KMS?

Relative advantage

9) How would the current/new KM technology have to be better than the previous technology for you to adopt it?

KMS compatibility

10) To what extent, if at all, do you think your values influence your ability to a knowledge management system? Probe: Please motivate your answer/ Why would you say so?

11) To what extent, if at all, do you think your work needs influence your ability to adopt the technology? Probe: Please motivate your answer/ Why would you say so?

KMS complexity

12) To what extent does making a knowledge management system difficult to use/understand harder to adopt? Probe: Please motivate your answer/ Why would you say so?

Top management support

13) To what degree do other employees in the organisation play a role in influencing your decision to use a knowledge management system? Probe: Please motivate your answer/ Why would you say so?

Complexity leadership

14) What characteristics would you expect from management to help you use the technology?

Competitive pressure

15) Describe how you think competitors would influence whether your organisation uses a knowledge management system or not.

Conclusion

16) Is there anything else you'd like to add?

17) Closure: Thank you for your time. If there are no further questions, then this concludes the interview.

As mentioned, you can e-mail me should you have any further questions.

Goodbye.

9. APPENDIX B: DISCUSSION GUIDE – SUBJECT MATTER EXPERTS

Time of Interview:

- Date:
- Place:
- Interviewer
- Interviewee:
- Position of interviewee:
- (Briefly describe the interview)

Welcome

Good morning. My name is Werner van Zyl. I'm a doctoral student in knowledge management at UNISA SBL
I'd like to thank you once again for being willing to participate in the interview aspect of my study. As I have mentioned to you before, my study seeks to understand why employees adopt/don't adopt the company's knowledge management system. The study also seeks to understand what factors drive this adoption/ non-adoption. The aim of this research is to construct a framework of KMS adoption so as to improve adoption of Organisation X's KMS. Our session today will be mostly 2 hours during which I will be asking you about your experiences with the KMS, your reasons for using/ not using the system, past experiences with the technology.

The nature of this discussion is such that confidentiality cannot be guaranteed, but your personal details will not be shared as part of the research findings and anonymity will be ensured throughout the process.

If you have a question, ideally put up your hand

You are able to contact me via e-mail at 62173812@mylife.unisa.ac.za after the interview should anyone have any questions.

If there's no further questions, then we can start.

Warm-up

- What is your role in the organisation?

- (Interviewer presents the preliminary constructed framework to the interviewer and
- describe its purpose)

- What do you understand from the framework as described to you?

Probe: In your opinion, to what extent is the framework relevant in the current business landscape?

- To what extent do you agree with each of the propositions outlined in the framework provided as influencing KMS adoption?

- Would you use this framework to implement a knowledge management system in your organisation?
- Probe: Motivate your answer

- What would you add? What would you remove?

- How might this framework for SMEs differ from that of larger organisations?

- How might this framework for SMEs differ from other IT systems in an organisation?

- What would your strategy be to ensure your employees adopt a new knowledge management system should you make use of this framework?

10. APPENDIX C: INFORMED CONSENT FOR MINI FOCUS GROUPS

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Cnr Smuts and First Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

Informed consent for participation in an academic research project

Knowledge management systems: an adoption framework for small and medium enterprises (SMEs)

Dear Respondent

You are herewith invited to participate in an academic research study conducted by Werner Richardt van Zyl, a student in the Master of Business Leadership at UNISA's Graduate School of Business Leadership (SBL).

The purpose of the study is to investigate the factors that possibly influence the adoption of knowledge management systems in small and medium enterprises.

All your answers will be treated as confidential, and you will not be identified in any of the research reports emanating from this research.

Your participation in this study is very important to us. You may however choose not to participate and you may also withdraw from the study at any time without any negative consequences.

The interview should take between 45-90 minutes and involves informal discussion on the topic.

The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

Please contact my supervisor, Professor S Henning (email: hennis@unisa.ac.za) or my Co-supervisor, Professor JA van der Poll (vdpolja@unisa.ac.za) if you have any questions or comments regarding the study.

Please sign below to indicate your willingness to participate in the study.

Yours sincerely

Werner Richardt van Zyl

I, _____, herewith give my consent to participate in the study. I have read the letter and understand my rights with regard to participating in the research.

_____ _____

Respondent's signature **Date**

11. APPENDIX D: INFORMED CONSENT FOR SUBJECT MATTER EXPERTS

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Smuts and First Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

Informed consent for participation in an academic research project

Knowledge management systems: an adoption framework for small and medium enterprises (SMEs)

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Your participation in this study is very important to us. You may however choose not to participate and you may also withdraw from the study at any time without any negative consequences.

The interview should take between 45-90 minutes and involves informal discussion on the topic.

The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

Please contact my supervisor, Professor S Henning (email: hennis@unisa.ac.za) or my Co-supervisor, Professor JA van der Poll (vdpolja@unisa.ac.za) if you have any questions or comments regarding the study.

Please sign below to indicate your willingness to participate in the study.

Yours sincerely

Werner Richardt van Zyl

I, _____, herewith give my consent to participate in the study. I have read the letter and understand my rights with regard to participating in the research.

_____ _____

Respondent's signature **Date**

12. APPENDIX E: PARTICIPANT INFORMATION SHEET

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Janadel & Alexandra Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

PARTICIPANT INFORMATION SHEET

Title: Knowledge management systems: an adoption framework for small and medium enterprises (SMEs)

Dear Prospective Participant

My name is Werner van Zyl and I am doing research with Prof Sanchen Henning and Andre van der Poll, Professors in Organisational Behaviour and Information Technology respectively, in the Department of Leadership & Organisational Behaviour and Computing, towards a Doctorate in Business Leadership (DBL) at the University of South Africa. I have funding from UNISA for my doctoral studies. We are inviting you to participate in a study **entitled** 'Towards a Framework for Knowledge Management System Adoption in Small and Medium Enterprises'.

WHAT IS THE AIM/PURPOSE OF THE STUDY?

The aim of this study is to identify factors that influence the adoption of knowledge management systems in small and medium enterprises.

WHY AM I BEING INVITED TO PARTICIPATE?

You were chosen to be part of this study because of **your organisation's** knowledge management system experience and therefore you would be able to provide insights as to why employees **choose/choose not to adopt the organisation's knowledge management** system.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY /WHAT DOES THE RESEARCH INVOLVE?

Your role will be to discuss aspects related to the adoption of knowledge management systems. The questions will be open-ended and so there are no right or wrong answers.

The study involves a focus group where the discussion will be audio recorded.

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Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

This focus group study is expected to last between **45 and 90 minutes**. This is to ensure maximum likelihood that all participants can attend the focus group session.

CAN I WITHDRAW FROM THIS STUDY?

Being in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason. However, once the data has been captured and analysed, you will not be allowed to withdraw from this study.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

By taking part in this study, your organisation will help identify strategies to improve the adoption of knowledge management systems to small and medium enterprises and thereby reduce costs incurred.

WHAT IS THE ANTICIPATED INCONVENIENCE/RISKS OF TAKING PART IN THIS STUDY?

The only foreseeable inconvenience is the time that you will sacrifice for being part of this study.

There is a risk that your personal information may come from others identifying the **person's** participation in the research. All possible efforts will be made to prevent personal information, during and after the interviews, being distributed without consent.

WILL WHAT I SAY BE KEPT CONFIDENTIAL?

The extent to which confidentiality of information will be maintained, your name or that of your organisation will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a fictitious code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings. As is the nature of focus group,

confidentiality cannot be guaranteed, although every effort will be made to ensure confidentiality.

ACCESS TO STUDY DATA

Your answers may be reviewed by people responsible for making sure that research is done properly, including a transcriber, external coder, and members of the Research Ethics Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

Your anonymous data may be used for other purposes, e.g. research report, journal articles, conference presentation, etc. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. While every effort will be made by the researcher to ensure that you will not be connected to the information that you share during the focus group, I cannot guarantee that other participants in the focus group will treat information confidentially. I shall, however, encourage all participants to do so. For this reason I advise you not to disclose personally sensitive information in the focus group.

HOW WILL INFORMATION BE STORED AND ULTIMATELY DESTROYED?

Hard copies of your answers will be stored by the researcher for a period of 5 years on a computer hard drive for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. The data be destroyed by being deleted completely from all hard drive partitions.

Your privacy will be protected when this research is published by removing any information that can identify you. Feedback of this study will be provided to you through the publication of a journal article and supplying you with the chapter detailing the findings.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

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Cnr Janadel & Alexandra Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

You or the organization will not receive any compensation/gifts/services as part of this study. This is to prevent bias towards answers received and reported in the study.

You will not be reimbursed for the any costs incurred by your organization or any of the participants.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

This study has not yet received written approval from the Research Ethics Committee of the College of Economic and Management Sciences, Unisa. A copy of the approval letter can be obtained from the researcher if you so wish after approval.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS?

If you would like to be informed of the final research findings, please contact Werner van Zyl on 084 810 2274 or 2173812@mylife.unisa.ac.za>. The findings are accessible for 6 months.

Should you require any further information or want to contact the researcher about any aspect of this study, please contact Werner van Zyl on 6273812@mylife.unisa.ac.za.

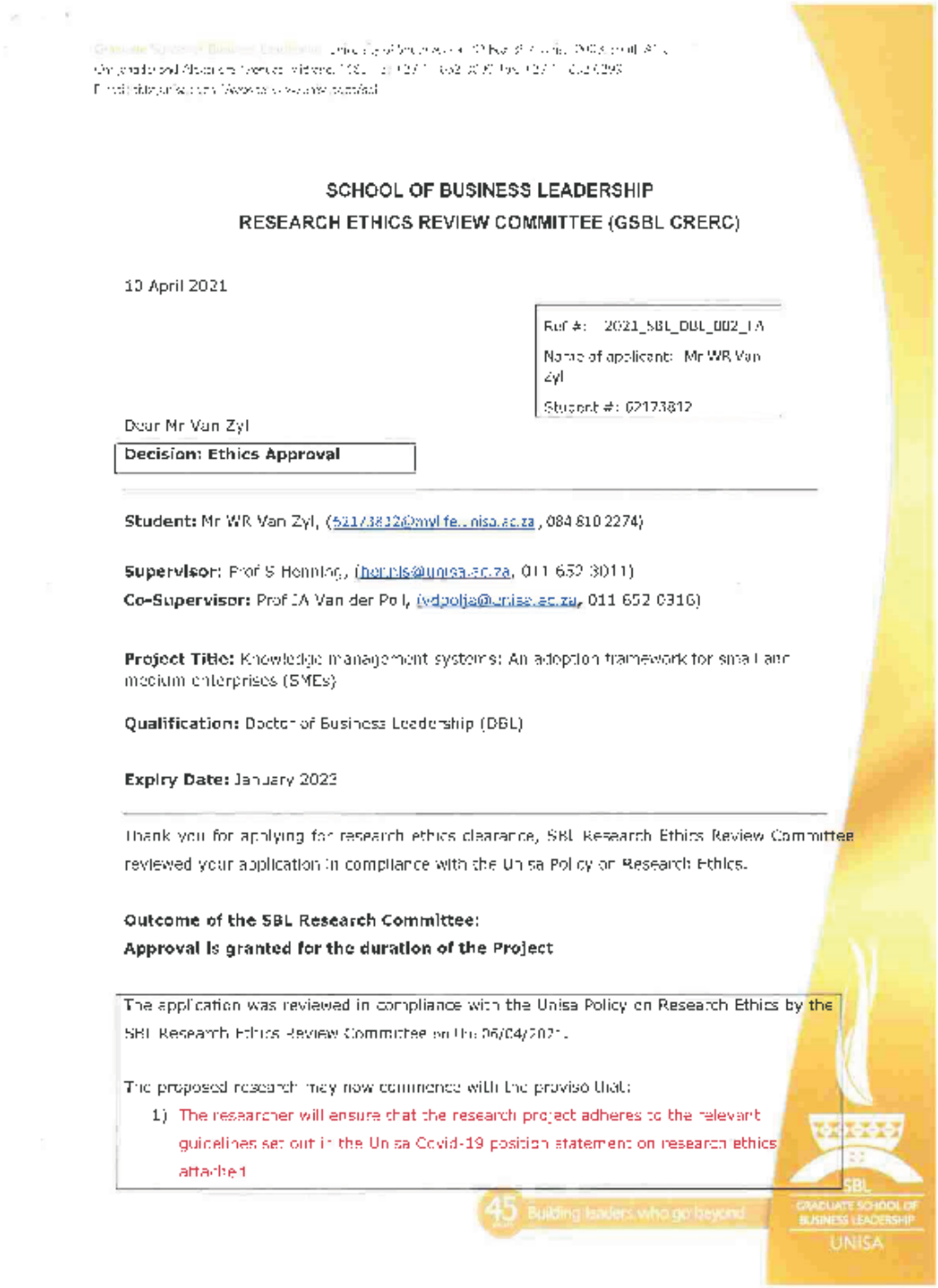
Should you have concerns about the way in which the research has been conducted, you may contact Prof Sanchen Henning on hennis@unisa.ac.za) and 011 652 03111.

Thank you for taking the time to read this information sheet and for participating in this study.

Thank you.

Werner Richardt van Zyl Date: 9 October 2020

13. APPENDIX F: ETHICS CERTIFICATE



SCHOOL OF BUSINESS LEADERSHIP

RESEARCH ETHICS REVIEW COMMITTEE (GSBL CRERC)

10 April 2021

Ref #: 2021_SBL_DBL_002_LA

Name of applicant: Mr WR Van Zyl

Student #: 62173812

Dear Mr Van Zyl

Decision: Ethics Approval

Student: Mr WR Van Zyl, (62173812@mylife.unisa.ac.za, 084 810 2274)

Supervisor: Prof S Henning, (henris@unisa.ac.za, 011 652 3011)

Co-Supervisor: Prof CA Van der Poll, (vdpolja@unisa.ac.za, 011 652 0316)

Project Title: Knowledge management systems: An adoption framework for small and medium enterprises (SMEs)

Qualification: Doctor of Business Leadership (DBL)

Expiry Date: January 2023

Thank you for applying for research ethics clearance. SBL Research Ethics Review Committee reviewed your application in compliance with the Unisa Policy on Research Ethics.

Outcome of the SBL Research Committee:

Approval is granted for the duration of the Project

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the SBL Research Ethics Review Committee on the 06/04/2021.

The proposed research may now commence with the proviso that:

1) The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached

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SBL GRADUATE SCHOOL OF BUSINESS LEADERSHIP UNISA

Graduate School of Business Leadership, University of South Africa
Corner Golden and Pioneer Avenues, Florida Park, 1709, Tel: +27 11 652 0256, Fax: +27 11 652 0270
Email: MSWELP@unisa.ac.za

2) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
3) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the SBL Research Ethics Review Committee.
4) An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.
5) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

Kind regards,

Prof P Msweli
Chairperson: SBL Research Ethics Committee
011 - 652 0256/ mswep@unisa.ac.za

Prof P Msweli
Executive Dean: Graduate School of Business Leadership
011 - 652 0256/mswelp@unisa.ac.za

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