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A Framework for Knowledge Management System Adoption in Small and Medium Enterprises

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Abstract: Knowledge is a key competitive advantage for small and medium enterprises (SMEs) as a way of competing with other organisations. There is a need to investigate SME adoption of knowledge management systems (KMSs). Knowledge management systems can only assist in this task if they are sufficiently adopted. The purpose of this research was to develop a conceptual framework for KMS adoption within an SME context. The research aimed to explore the interdependencies between various contextual KMS adoption factors, namely the technology, organization, environmental and human behavioural contexts. Four mini-focus groups were conducted and included employees in SMEs. Thematic analysis identified nine themes that describe the dynamics that either promote or prevent KMS adoption. The findings provide deeper insights into the influencing factors in KMS adoption to enhance SME performance and competitiveness. The KMS adoption framework can be applied to improve the adoption of technology in SMEs. Future research could include SMEs in specific industries to compare adoption factors and could also include larger organisations.

Keywords: small and medium enterprises; technology adoption; knowledge management systems; Technology–Organisation–Environment (TOE) framework; digital transformation

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1. Introduction

The purpose of this research was to develop a conceptual framework for KMS adoption within the SME context. In addition, the study aimed to understand the interplay between different KMS adoption factors and how these dynamics interact to either reinforce or diminish contextual factors on KMS adoption. Furthermore, the researchers explored the possible drivers behind KMS adoption in SMEs that could improve business profitability.

The management of knowledge is not just privy to large organisations with more resources [1]. According to [2], SMEs rely on their relational capital, but can only do so if they leverage these resources. The management of KM tasks and processes are a vital part of SMEs. SMEs find a greater necessity to manage organisational knowledge in a competitive environment, as they possess fewer resources with which to compete with larger organisations [1]. IT/information system (IS) can leverage SME KM practices and advance them further into the knowledge economy [3]. Innovation and IT is crucial for effective KM [4]. Worldwide, in the United States and Europe for instance, SMEs comprise the vast majority of gross domestic product. This observation is even more true in developing countries. Likewise, South African SMEs are a crucial driver of economic growth. SMEs make up 98% of the formal sector, providing employment to between 50 and 60% of the labour force across all sectors [5]. According to [6], the small and medium enterprises (SMEs) sector generates 70% of total employment for more than 95 countries [7]. Thus, SMEs are crucial to the economy, and yet very vulnerable to the wrong strategic decisions.

For many SMEs (and large organisations), the main competitive advantage is no longer physical but intangible in the form of information and knowledge [8]. Technology has become more accessible as it becomes more affordable and more disseminated, clearing a path for knowledge management systems (KMSs) to be adopted. However, their contribution to the digital revolution is impeded with low technology adoption and the inability to manage skills and innovation resources [9].

2. Literature Review

2.1. Knowledge Management

The purpose of knowledge management is to increase resources of organisational knowledge, improve performance and create a competitive advantage, [10,11]. The creation of knowledge is imperative as part of today's globally competitive environment. Without proper knowledge, an organisation cannot be fully competitive, much less maintain a competitive advantage. The benefits of KMSs are wide-ranging and include an increase in profitability and more efficient and effective business processes, among others.

KM practices in SMEs can provide specific benefits such as improved customer service, more efficient processes and procedures and better communication [12]. Still, there have been large highly publicised cases of information system failures. For instance, an IS implementation by Hewlett-Packard failed at a cost of $160 million [13].

The benefits of information systems are multidimensional, such as improved effectiveness and efficiency, translating into higher organisational profitability. Despite these benefits, decades of research have identified many factors for information system failures and successes and are far-reaching [14]. For KM efforts, the reasons for failure range from a lack of executive leadership, inadequate processes and technology, a lack of understanding and a lack of participation at all organisational levels.

Despite the benefits of KM implementation efforts, they do not guarantee the full adoption of IS systems such as knowledge management systems (KMSs). Large organisations (>200 employees) possess significantly more resources than SMEs and are therefore more resilient in the face of KM adoption failures. For SMEs, it is becoming increasingly important that their organisational intellect is managed in a systematic way. In addition, limited research exists on the factors that contribute to KMS adoption in the SME context.

This research is important for several reasons. The findings of the study may support SMEs in remaining competitive in an increasingly globally competitive workspace. Furthermore, the role of human factors, such as mood, personality, motivation and beliefs, should be investigated in terms of knowledge management systems [15]. To fill this gap, beliefs and motivation will be included as part of possible factors to be investigated in a KMS context. The role of CSF has seldomly been investigated. By incorporating these success factors, a more robust framework can be developed. By implementing factors contributing towards successful KMS adoption, organisational efficiency and productivity can be improved [1]. Large organisations have more financial resources to implement information systems (IS) and have a greater probability of recovering from IS failure. Large organisations also possess more IT infrastructure, systems and processes in place to transform the influx of information into knowledge. SMEs are crucial to the economy, yet very vulnerable since they are much smaller than large organisations, which have free resources for resilience. SMEs are also more vulnerable to the exploitation of intellectual property by larger corporations. In comparison, SMEs have been slow to adopt cloud computing, which includes knowledge management systems [16,17].

The work-from-home revolution catalysed by the COVID era has compelled organisations to even more closely manage their knowledge driven by the high rate of resignations in large and small organisations [18].

The current state of economies worldwide has caused companies to become more competitive, since organisational competition is no longer geographically bound (nationally and internationally). Competition for knowledge is now global for even the smallest SMEs.

Insufficient knowledge management can lead to a decline in organisational performance, innovation and service delivery to clients, and ultimately a decline in revenue [18]. Globalisation is accelerated by ICTs [19], creating the opportunity for organisations to manage their knowledge more efficiently and effectively. The benefits of ISs are multidimensional, including improved effectiveness and efficiency, translating into higher organisational profitability. Despite these benefits, decades of research have identified many factors for information system failures and successes [20,21]. Innovation in information and communication technologies (ICTs) has greatly affected the introduction of new KMSs as they become cheaper and more user-friendly [3]. Cloud computing has also emerged as a knowledge management system (KMS) adoption alternative that has increased in recent years [22–24] in SMEs. This is bound to be a more compelling technology in future, especially considering the work-from-home culture that has emerged since the COVID-19 pandemic.

An increase in organisational, technological and environmental (e.g., social) systems is emerging as a result of a more integrated business environment. Using a systems paradigm, we will discuss the role of KMS adoption using features from within a system-thinking theoretical paradigm [25].

The authors aim to address important issues in the adoption of KMSs in SMEs, thereby advancing the field of information systems. Furthermore, KMS adoption models that focus on SMEs have also been limited [26]. This study will expand on previous work by identifying factors in the TOE contexts as identified by [27] pertaining to KMS adoption. Furthermore, this study will add a nuanced behavioural context and gain further insight into the adoption of KMSs in vulnerable SMEs. By completing this research, the study may advance the understanding and scientific knowledge of KMS adoption failure in SMEs and significantly improve the effectiveness of adoption thereof.

Current studies combine Rogers' [28] Diffusion of Innovation (DOI) theory with the Technology–Organisation–Environment (TOE) framework. The former is well established in the literature. According to a review of the IS adoption literature by [29], the DOI is able to identify "perceived critical characteristics of technological innovations (such as relative advantage, compatibility, complexity, observability and trialability) that may influence the attitude of potential adaptors or rejecters of IS" (p.6). Previous research has argued that the TOE framework is consistent with Rogers' DOI theory [30]. Constructs in the DOI theory have been found to be significant in many studies which have been used in the TOE frameworks, such as compatibility and relative advantage.

Critical success factors have been used successfully in the past to study KMS adoption [31–34].

The addition of critical success factors will provide a more comprehensive view of the factors affecting KMS adoption in SMEs, as we targeted information systems adoption in SMEs specifically.

2.2. Knowledge Management Systems and SMEs

The day-to-day operations of an SME often do not include the management of information. Yet, in a knowledge-driven economy, this should be one of the principal tasks within an SME. Knowledge management systems are aimed at managing organisational knowledge. In this sense, knowledge management can be defined as "the capability to acquire, create, codify, applying and protecting knowledge within the organisation". That is, they are IT-based, socio-technical systems designed and developed to maintain and enhance the organisation's KM processes. Successes within KMSs have been documented in case studies and provide evidence to the value that KMSs can add to an organisation, if they are properly adopted [35].

SMEs are not simply smaller versions of large organisations. A non-linear relationship exists between small and large organisations. The latter's size allows it an increasingly greater ability to deal with adverse events, such as a KMS failure. Their limited financial and human resources in SMEs, among others, makes them less able to compete with larger

organisations, afford expensive KM systems or deal with KM failure. SMEs have many benefits to gain from adopting KMS tools and techniques [3] and need to make the most of KM guidance to benefit from KM resources. Furthermore, SMEs are reliant on relational capital to increase their innovation capacity [2]. To this end, researchers have investigated the factors influencing KMS adoption. Studies investigating the critical success factors (CSF) for information systems and, in particular, KMSs have identified a plethora of success factors [34].

In order to investigate the factors that influence KMS adoption systematically, the Technology–Organisation–Environment (TOE) framework is utilised while integrating the DOI theory as well as salient CSFs for KMS adoption. The framework also captures a holistic perspective from a systems theory paradigm.

Individual-level adoption frameworks gained prominence with the technology acceptance model (TAM) of [36]. The TAM has since been revised over the years through the work of, among others [37–39]. A limitation of these models is that they emphasise factors related to the individual context, thereby ignoring contexts related to the technological, organisational and environmental contexts, a gap which this framework aims to complement.

2.3. Managerial Implications

It is anticipated that the constructed framework will provide deeper insights for executives. Establishing common goals and vision through the necessary top management support for followers may enable more efficient adoption and usage of KMSs. In particular, the researchers aimed to provide deeper insights regarding the effect of behavioural aspects on the adoption of KMSs in SMEs. Employees with high levels of self-efficacious behaviour and motivation are expected to positively influence the adoption and use of KMSs. A comprehension of technological factors may also contribute to a more usable KMS, while social pressure from the external environment takes into consideration the usability and competitiveness of a specific KMS. In this regard, the study contributes to the extant literature regarding the adoption of KMSs by SMEs in South African companies.

Through focus groups, the authors identified emerging themes to compliment the extant literature on KMS adoption as part of the conceptual framework. The second phase of the research was to assess the face validity of the proposed framework as perceived by subject matter experts, through personal in-depth interviews.

3. Problem Statement

The information system that facilitates the knowledge management cycle, from acquisition, sharing and application to improving organisational processes, is a KMS [40]. The implementation of KM initiatives in SMEs may be even more crucial, as knowledge may be their single key resource. Small organisations, with fewer resources, are at a greater disadvantage as opposed to larger organisations. More resources imply wider options of KMS to choose from and greater resilience in the event of implementation failure. With the knowledge economy in full swing, the importance of KMSs in organisations cannot be overestimated. There is a consensus that organisations that apply knowledge have a major competitive advantage over other organisations [41–44]. In the knowledge economy, the pace of technological advances is accelerating [45]. This brought knowledge, its creation and management to the forefront [3].

Considering the number of technology adoption models and frameworks in the IS literature consisting of both individual-level and organisational-level adoption, it is imperative to note that the role of adoption in SMEs has not been thoroughly investigated. Some studies focus on e-learning, IT/IS and knowledge management systems, while others are country-specific (e.g., [33]). Even though the majority of studies focused on large corporations, only a few studies aimed to identify factors that influence KMS adoption in SMEs [26,40].

Combined, three important points emerged from the literature and are consequently highlighted. Firstly, as the competition for resources migrate from tangible to intangible, knowledge is becoming a competitive advantage for organisations of all sizes. Secondly, SMEs make a significant contribution towards developing nations' GDP, including South Africa. Lastly, studies pertaining to the factors that influence KMSs in SMEs are limited [26]. Therefore, this study will aim to contribute to the body of knowledge by identifying these factors.

4. Materials and Methods

The relevant literature and theories relating to KMS and SME adoption factors were considered for inclusion in the conceptual framework.

4.1. The Technology–Organisational–Environmental Framework

The Technology–Organisational–Environmental (TOE) framework is an organisational-level framework which was originally developed by Tornatzky and Fleischer [27]. The TOE framework was found to have a strong application for adoption in information systems [46].

It includes three contexts, namely technology, organisational and environmental. The technology context refers to all the technologies, internal or external, that are currently available to the organisation [27]. A review of information system adoption in SMEs based on the TOE framework [28] identified three variables affecting the technological context, namely relative advantage, complexity and compatibility. The organisational context refers to resources available to the organisation for the adoption of innovations [47]. Variables in past studies included satisfaction with existing systems, top management support, organisation scope, financial resources and IT infrastructure complexity [40]. The environmental context refers to the influence that environmental factors have on the organisation, such as competitive pressure.

Since the TOE is an organisational-level framework, it has neglected to include individual-level factors as part of the framework. The conceptual framework proposed in this study aims to augment the research by also including a behavioural context. Regarding the behavioural context, participants emphasised the importance of the KMS understanding their needs, abilities and limitations. The author of [36] identified two related concepts, namely ease of use and perceived usefulness, to capture the idea of the lack of effort a task takes to perform.

4.2. The Diffusion of Innovation Model (DOI)

The DOI theory was originally developed by [28] relating to the diffusion of technology and ideas through cultures (i.e., why and how it happens and at what rate), and includes both individual and organisational levels. At the organisational level, the model relates variables independently under individual characteristics, internal characteristics of organisational structure and external characteristics of the organisation (openness of the system). The model has since been applied to other contexts, including IS adoption and e-business, among others [46]. In line with a holistic perspective, it has been suggested that the DOI theory be integrated with other consistent frameworks such as the TOE framework.

In terms of the DOI, [48] highlights a limitation: "Moreover, 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 such as Social Cognitive Theory" (p. 62). This shortcoming was addressed through the inclusion of the construct KMS self-efficacy in the initial conceptual framework. A more recent review of the DOI is discussed by [49], with avenues for future research in this field.

4.3. Critical Success Factors

Critical success factors (CSF) are defined by [50] as "the limited number of areas in which results, if they are satisfactory, will ensure competitive performance for the organisation" (p. 12). Critical success factors have been empirically studied in the past [51] to identify

the relative importance level of each CSF. This perspective aims to provide further credence in the adoption of KMSs in SMEs. The literature review describes numerous antecedents and CSFs. In particular, this study will outline how CSFs relate to KMS adoption factors.

CSFs have faced some criticism in the past, such as lacking theoretical underpinning and inconsistent definitions of what constitutes a CSF [32]. There is, however, considerable overlap in the identified CSFs for knowledge management indicating the importance of those CSFs. The most prominent CSFs identified in the KM literature include organisational culture, training, strategy, leadership, top management support, human resources, rewards, motivational aids and IT infrastructure. Motivational aids and rewards' explicit inclusion in the technology adoption models have also been neglected. Yet, the inclusion of motivational aids and rewards in the CSF literature has shown clear prominence [52].

In response to the frameworks identified in the literature, the next step was to identify factors that are salient in the adoption literature, particularly pertaining to SMEs. In addition, the researchers addressed several gaps in the literature, integrating individual-level KMS adoption factors with the TOE/DOI literature. The researchers could not find any study integrating CSF research with the TOE and DOI.

Congruent to a qualitative methodology and based on the available literature, a set of propositions were formulated. The propositions constituting the framework are consequently described. Figure 1 depicts the data collection process of the study, starting with the preliminary propositions identified in the literature.

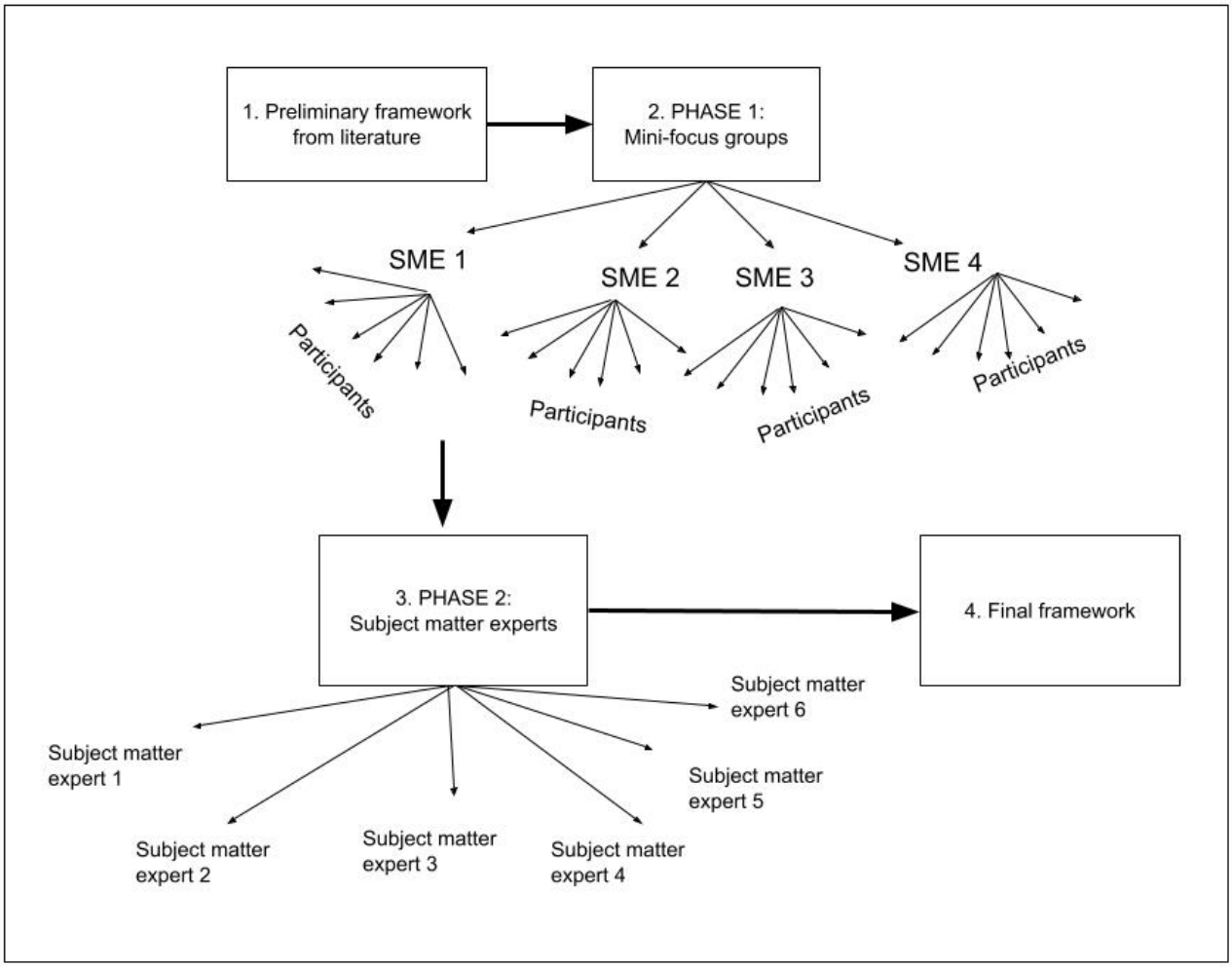

Figure 1. Research design process for data collection.

5. Propositions

A systematic analysis of the propositions as identified in the literature was conducted.

A theory of behavioural change was developed by [53], namely social cognitive theory (SCT). A specific form of IS self-efficacy is known as knowledge management system self-efficacy (KMS self-efficacy). KMS self-efficacy "affects individual behaviour by influencing an individual's beliefs, attitude, and self-confidence in the face of obstacles in KMS related tasks" [54]. The role of self-efficacy on information system adoption has been found to be inconsistent with some findings, indicating insignificant, negligible and significant influences [55]. However, the authors of [53], who conceptualised self-efficacy, noted that self-efficacy is domain-specific and may therefore still have an influence on KMS adoption. Nonetheless, self-efficacy appears to play a critical role in technology adoption, including KMS adoption [56]. Thus, self-efficacy, in its various conceptual forms and effects, play an important role in technology adoption. Based on the discussion, the following proposition emerges:

P1: *KMS self-efficacy advances KMS adoption in SMEs.*

A common theme throughout the technology adoption literature is that of motivation and self-efficacy [57]. The absence of incentives may result in a lack of knowledge sharing among employees. On the contrary, the presence of incentives plays a key role in KM initiatives [58]. For this study, rewards will refer to "influential people who provide reward systems for employees to encourage their usage of KMS" [59] (p. 334). It is the responsibility of employees to create and codify knowledge for use by others as well as create and codify their own explicit knowledge. Based on the discussion, the following proposition emerges:

P2: *Motivational aids and rewards advances KMS adoption in SMEs.*

Whereas self-efficacy represents the measure of internal control to the adoption of the new technology, top management support reflects the external control about adoption [60]. Management support facilitates the necessary resources and tools for people to use, including access to hardware and software. Top management should embrace KMS diffusion and adoption by having a clear KMS knowledge strategy [61]. Top management support is seen as a critical success factor for information system (IS) project success [62]. In particular, studies continue to emphasise that the two most salient factors in KMS adoption in SMEs are top management support and leadership [8,26].

P3: *Top management support advances KMS adoption in SMEs.*

Participants reported that top management support is integrated with organisational leadership. The authors of [51] assert that leaders should highlight knowledge sharing and co-operation across the organisation. To remain within systems thinking in information systems and the complexity paradigm as opposed to a Newtonian paradigm, the inclusion of complexity leadership is appropriate [63–65]. In a complexity reality, leaders need to be sensitive to building good-quality relationships, as every person is connected to every other as part of a larger system. Leaders embracing this paradigm are holistic, which means they have the ability to see patterns and relationships between elements. Being a complexity leader also means having the courage of one's convictions to stand against the masses, even when everyone else is telling the leader he/she is wrong [64]. Complexity leaders are able to see the bigger picture to view opportunities and problems from a new vantage point. Seeing things in a new context allows new perspectives to emerge. Furthermore, the quantum leader is humble, being able to admit ignorance or when they have faulted. With this humility, the complexity leader is amenable to new experiences, being able to celebrate diversity of views, ideas or experiences. This is a necessary condition for systems to be able to adapt to an ever-changing environment. Finally, the common, interconnected bond all humans share with each other causes the leader to act with empathy and compassion to everyone while being able to deal with complexity and chaos [64]. Based on the discussion, the following proposition emerges:

P4: *A complexity leadership style advances KMS adoption in SMEs.*

Relative advantage is defined as the degree to which an innovation is perceived as providing greater benefits to the organisation than the idea that superseded it [28]. Interestingly, in a cloud computing context [66], relative advantage has been rejected. However, the authors note that this finding is in stark contrast with previous findings that relative advantage has an influence on cloud computing. Virtually all the studies that used relative advantage as an antecedent as part of the DOI theory were statistically significant [67]. Based on the discussion, the following proposition emerges:

P5: *Relative advantage advances KMS adoption in SMEs.*

Compatibility refers to the degree to which a technology is perceived as consistent with existing values, past experiences and adopter needs. Recent findings indicate that compatibility has a significant influence on KMS implementation in organisations [40]. Other IT adoption studies involving SMEs revealed compatibility as a determinant of IS adoption [23]. The higher the adaptability, the higher the likelihood of innovation adoption [68]. Based on the discussion, the following proposition emerges:

P6: *Compatibility advances KMS adoption in SMEs.*

Complexity refers to the extent to which a technology is perceived as being hard to understand and use [28]. Change in organisations, specifically when it involves a novel IT innovation, includes many employees, departments, knowledge of the organisation and the KMS involved.

P7: *High complexity negatively advances adoption of a KMS in SMEs.*

Competitive pressure refers to the degree to which an organisation's industry adopts an innovation [69]. The business environment is complex, since each organisation interacts with subsystems within the organisation (i.e., teams, departments) and suprasystems in its environment (e.g., competitors). As competition becomes fiercer among competitors, their need to increase competitive advantage through innovation should increase.

Following on from these discussions, Table 1 below summarises the propositions for the preliminary conceptual framework in table format.

P8: *Competitive pressure advances KMS adoption in SMEs.*

Table 1. Propositions in the preliminary conceptual framework.

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

6. Theoretical Paradigm

This study adopts selected concepts from systems theory as a theoretical paradigm. Systems theory studies the interconnected nature of systems. The relevant concepts for this study are presented in Table 2. Selected systems theory concepts are presented, as they are applicable to the study.

As indicated above, data were collected using focus groups as part of the first phase of the data collection process. SMEs with less than 200 employees were sourced from within South Africa. Four mini-focus groups were conducted with SMEs, with 4–6 participants within each focus group. All participants were employed at the enterprise for a minimum of three years and had experience with the KMS in use. Each participant was given an information sheet describing the purpose of the research and the purpose of the interview, as well as their rights as participants. Before the interviews commenced, each participant

was requested to sign an informed consent form, wherein they were informed of the confidentiality of their responses and how the responses would be used, as well as their ability to withdraw from the interview for no reason at any point without the need to disclose a reason(s).

Table 2. A selection of concepts of system theory.

Concept	Definition	Description
Systems	The idea of systems gained extensive popularity with the publication of General Systems Theory by [25]. All systems are entities composed of elements, interconnections and purposes that produce their own behaviour over time. They are inexorably linked to the observer [70].	The SME functions in an open system in constant flux with the environment. The system is constituted of subsystems (the various internal SME contexts) that constantly interact with each other in turn at various levels of intensity and disproportionately influence one another.
Openness	An open system interacts with the environment. Energy and information pass through a porous boundary to the environment and from the environment to the system [25].	A constant stream of resources and/or information are necessary for the system to allow the right resources in and out. SMEs interact with the external environment. Therefore, the stream of information between the SME and the external environment influences the choice of KMS. Influences from the SME's internal contexts affect the input and output to the KMS.
Feedback Loops	Mechanisms characteristic of systems that lead to growth, amplify deviations or counteract change in the system [71]. The words "positive" and "negative" do not denote an emotional connotation, but rather whether the direction of the system is amplified, or whether the amplification is halted to bring the system again to a stable state, respectively.	A positive feedback loop is created when self-efficacious behaviour facilitates adoption, which in turn further reinforces beliefs of self-efficacy by other employees, creating a cycle of change. Conversely, the absence of a critical success factor (e.g., technical support), affecting a novice user's adoption of the KMS, can lead to negative sentiment among co-workers and thus resistance to adoption. Negative feedback loops inhibit change and keep a system "stuck" in old strategies or behaviour, preventing the adoption of new technology or change. Conversely, negative feedback loops can also prevent negative sentiment from creating further negative sentiment by alerting leadership and top management to corrective action.
Interdependence	Parts of a system (subsystems) never exist in a vacuum. Any part of a system is influenced by systems of which it is composed (subsystems) and of which itself is part of a larger system (suprasystems).	An SME's subsystems are the various contexts (e.g., technological, organisational) of which it is constituted. The environmental system within which the SME exists has a direct influence on the SME's ability to operate, with the SME acting on the environment to affect change in turn.

Thereafter, the researcher used a discussion guide to engage conversation. The questions in the discussion guide were designed to elicit responses pertaining to participants' understanding of knowledge management, the importance of KM in their work and reasons to use a KMS more (or less), as well as probing questions regarding the factors identified for KMS adoption in the literature. To prevent biased responses, the participants were not exposed to the preliminary conceptual framework. Data were analysed using the software package Atlas Ti. Maintaining a list provides an analytic opportunity to organise and reorganise the codes into major categories, subcategories and ultimately into themes [72]. The focus groups were conducted and transcribed by the first author.

Data were analysed through thematic analysis using Atlas Ti. This analysis technique has the goal of identifying themes that emerge from the data as part of a study's research question, goals and conceptual framework. Firstly, data were coded, after which the codes were sorted into categories. Finally, the categories were used to identify patterns of meaning in the form of themes until a point of saturation had been reached [73–75]. The focus group findings are presented next.

7. Findings

A total of four mini-focus groups were interviewed using a blended approach, that is, either in person or online. Each mini-focus group was conducted within two hours and consisted of 4–6 participants.

The following convention will be utilised for participant interviews:

$$x^{th} \text{ participant in focus group (FG) } y = FGy.x$$

Based on the focus groups, the lived experiences of the participants culminated in a total of nine themes, which originated from the discussion guide (see Appendix A) The emerging themes were: User experience of KMS interface, Technical support, Top management engagement, Purposeful work contribution, Desire for effort, Striving for excellence, Difficulty in understanding the KMS, Non-user-friendly interaction and Obstructing efficient use of time or resources.

7.1. User Experience of KMS Interface

User experience refers to a person's perceptions and reactions resulting from the use and/or anticipated use of a product, system or service [76]. In this case, it is the use of the KMS. This theme was the most frequently mentioned, with 79 mentions in total by all four SMEs. This indicates that a user prioritises the perceived difficulty of using the system, coupled with time they will save or waste while using the system as opposed to using other means. The technology acceptance model (TAM) by [39] acknowledged the importance of self-efficacy, which forms the basis for the model's constructs of perceived ease of use and perceived usefulness. However, the TAM neglects an organisational context. These two constructs imply an increase in adoption if the experience of the user should be free of effort and would make his/her job performance easier. The need for the level of effort to be equal or below that of the task is also discussed in the literature, as indicated by the usability literature (e.g., [37]). One of the SMEs, which was using a KMS that was not functioning in line with the intended purpose, commented on a previous system that they used, highlighting how easy the system was to use with minimal effort.

> *"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 clicked on a button and it took me to where I wanted to go. . . . 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."* (FG4.1)

A participant from another SME commented about the ability of a good system being able to allow them to avoid sending out instructions manually to every recipient, thereby freeing up time and effort. The participant also said that the system should be a collective effort so that other participants also reap the KMS benefits.

> *"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 (in) 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."* (FG1.2)

These interventions will ensure participants have more time at home to spend with family (free time) and will not have to deal with work issues at home. These findings agree with the individual-level adoption models when considering Davis's [36] concepts in the TAM (i.e., ease of use and perceived usefulness). A reinforcing feedback loop may exist between a positive user experience and the other themes. A positive experience could possibly lead to a user, for example, experiencing more purpose at work. Similarly, the user might require a small transitional period from the old to the new system.

7.2. Technical Support for Adoption

The KMS adoption literature contains limited discussions of Technical support as a driver of adoption. Technical support was the theme mentioned the least—only five times by three of the SMEs during the interviews. For technology adoption to be successful, some level of Technical support needs to be available to the user [7]. Participants in all the SMEs mentioned throughout the discussions that support, in various forms, such as training, workshops and manuals (on the KMS), is important for the KMS to be adopted.

> *"So I think if you introduce a system, 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."* (FG3.2)

A number of participants implied that training on its own is not sufficient. Technical support encompasses factors that will enable the system to function optimally. Besides providing these support structures, making usage compulsory while not providing the necessary training and support was viewed as a "demotivator".

> *"I think if you force people to use it without giving them the necessary skills as well, whether it be training or technology, or 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."* (FG3.1)

A major barrier in IS system adoption is high training costs [77]. Although [52] investigated factors for KM adoption in SMEs, training was found to be a notable CSF in only three of the fifteen studies reviewed in [74]. However, the conceptual model developed in the study confirmed that employee training and "taking advantage of special training department" were validated as part of the model.

7.3. Top Management Engagement

Top management support is seen as one of the most "unequivocal" critical factors in the adoption of information systems [78,79]. Therefore, this finding is consistent with findings in both KMS adoption models. The CSF literature highlights top management as a critical factor in technology adoption [80].

We found that engagement with top management better conceptualised the requirement for KMS adoption by users, as it encompasses a hands-on approach by management. Top management engagement was mentioned 12 times by the participants.

In line with the quotes from participants regarding Technical support, management should be constantly involved in the adoption and use of the system to gain a full understanding of user requirements. Such a situation was made clear by one of the participants in the following case study:

> *" . . . they [top management] must also be open to critique from below. I have been in a situation where I worked for someone where they had a 'my way no highway option' . . . if management comes in and says 'we decide that this system will work well, these are the reasons why we decided, what is your opinion on this? And if you can then throw opinions around a bit; have an impact on the system that's in use I think that also improves willingness a lot."* (FG3.1)

In favour of the need for technical and top management support, management needs to remain engaged with the adoption.

> *"Support was excellent so I think those things, I would go back to that system compared to what we've got now . . . "* (FG4.3)

The extent to which top management is cognizant of the importance of KM practices and its involvement with these practices has been extensively studied in the IS and KM literature. In terms of KMS adoption, top management support refers to the external level of control about the adoption [60]. According to [78], top management should create a

suitable environment and act as change agents for success, and should also ensure an adequate budget and material for skills training and encourage employees to adopt the KMS. Not only is the support by top management seen as a critical success factor, but it is also emphasised by [26] as a salient factor in KMS adoption.

Some participants emphasised that it is very important for management to not relinquish perceived control of the use of the KMS by making it compulsory for employees to use. In contrast, management's role was deemed to ensure that the old system is no longer an option and that the current KMS use is now compulsory. This view is in line with the observation that the acquisition of a KMS does not automatically guarantee full use of an IS, given that some employees tend to resist an information system after implementation [55]. Indeed, the success rate of KMS implementation and adoption is still, despite research in the field, less than desirable.

7.4. Purposeful Work Contributions

It is important for employees to perceive their work as having purpose and meaning, both on a technical and strategic level [79]. Previous findings based on individual-level technology adoption models, such as those by [38,39], have found that intrinsic motivation plays a significant part in perceived ease of use. We found that purpose was a strong motivator for participants.

Participants referred to personal purpose (i.e., why do I need to use it?) and the purpose of the KMS (i.e., how is the KMS going to contribute to making my work easier?). A participant remarked:

> *"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'."* (FG3.2)

Participants wanted to have a larger purpose of adopting the KMS than just being able to help them manage organisational knowledge, so-called "systemic purpose". All of the SMEs echoed this sentiment to a large extent. Statements reflected by participants included:

> *"There's too much information, too much data. And your main goal would be to start at a basic level of a KMS, which would be to make it user-friendly. It is not anymore about 'do you have all the information?' Yes, there is too much information . . . 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."* (FG:2.3)

Conversely, a lack of guidance from management (leadership) causes resistance.

> *"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."* (FG1.4)

With regards to purpose and meaning at work, the researchers could not find any literature relating to this theme.

7.5. Becoming Knowledgeable and Motivated through Empowerment

To ensure the usefulness of an information system requires user involvement and motivation for users in order to transfer the knowledge [81]. KMS adoption models have identified user involvement as a success factor in adoption, with greater involvement maybe motivating users to become more knowledgeable [82], which is thus consistent with the current literature.

As alluded to earlier, participants noted that training and Technical support of some kind is helpful, whether on an initial or continual basis, for KMS adoption. In response to the question: "To what extent does the fact that you understand the system affect your adoption of the KMS?", a participant noted that training will increase their motivation to use the KMS.

> *"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."* (FG3.2)

Another participant observed that colleagues should not be fearful of making mistakes when using the KMS, observing that they should develop a propensity for mastery.

> *"... 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."* (FG3.3)

One SME's chief executive officer, who engaged in the interviews himself, was of the opinion that the SME will direct employees towards greater purpose, but that there needs to be a degree of autonomy and self-directedness from employees themselves.

> *"People must be mature, they must be directed, they must know what their calling is 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."* (FG2.4)

In summary, the characteristics that were identified to assist in the adoption of the KMS is:

- A willingness to try;
- Being studious;
- A positive attitude towards novel technology.

7.6. Striving for Excellence in Work Responsibilities

Mastering technology plays a role in technology adoption in SMEs, particularly from SME owners, as they are the main decision makers.

Similar to the discussions that employees should endeavour to adopt the KMS, some discussions centred around striving to be more proficient on a continual basis.

One of the SMEs interviewed utilises a workforce optimisation tool as part of their consulting that identifies behavioural patterns in clients. During the interview, the responses were often framed in the said system's terminology. The concept of innovation, in this context, refers to an individual's ability to take on increasingly more challenging tasks.

> *"... 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 really want to find a new way and better way and a more efficient way'."* (FG2.1)

Along a similar line, on the question "To what extent, if at all, do you think your values influence your ability to adopt a knowledge management system?", a participant responded:

> *"I want to be more effective . . . I want to have a bigger impact in the world. And tool 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."* (FG2.4)

Current theories do not include literature relating to excellence in work responsibilities.

7.7. Transitional Space and Time from Old to New Systems

We found as part of the discussion guide that participants' responses were different when the questions were framed in the negative as opposed to the positive. For this reason, we considered asking why participants find it difficult to adopt a KMS or why they do not adopt it at all.

Depending on how steep the perceived learning curve is for adoption of the KMS, the higher or lower the adoption rate is likely to be.

> *"Yes, and I think the learning curves should perhaps not be too large or too long so it doesn't get someone under."* (FG3.1)

Along the same lines, responses echoed in one SME, that there needs to be a transition period between the old and new KMS which needs to be adopted. On the contrary, another participant noted that there should be no transition period to the new KMS.

> *"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."* (FG3.2)

This theme is not directly consistent with current scholarly discourses in this field. The more difficult a technology is to understand, the less likely it is to be adopted is in line with Rogers' [28] construct of complexity in the DOI theory.

The more technological capabilities align with the demands placed on a person by the task, the more positively the task will be executed. The greater the fit between the technology, task and the user, the easier it will be to execute the task and the less the costs of performing the task(s) will be [83]. Conversely, as mentioned by participants, a technology that fails to fit the tasks of the work and the needs of the users will not be adopted. The fit between task and technology has been studied in the literature as a barrier to adoption [84]. If a technology is not a good fit with a task (i.e., using the KMS), then the technology is less likely to be adopted.

One participant shared the following personal experience with a banking application that he found easy to understand from first use without needing any training or support. This is in contrast to the current KMS in use at work, which is difficult to use.

> *"Well (FG1.2) gave a few suggestions . . . Making it searchable, making it understandable, but still keeping it accessible and easy to scan and understand 'Oh this is what we've done'. Like visual. Yeah, I think it's just the accessibility and the searchability . . . "* (FG1.4)
>
> *"I want to give an example of a system I think works really well. I'm not sure if anyone of you are with Capitec."* (FG.4.1)
>
> *Interviewer: Yes, yes.*
>
> *" . . . 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. So I actually wish Stasey [the current KMS] is so simple. . . . I literally only have three options and under that, I understand where it's going."* (FG4.1)

7.8. Incomprehensible Interaction between User and KMS

This theme was mentioned 18 times, making it the second-most frequently mentioned theme. Similar to the theme of User experience, participants want their experience of the KMS to be free of effort as much as possible. Combining this theme with the perspective of asking participants what they find difficult to adopt, or not adopt at all, about a KMS, the theme of Non-user-friendly interaction emerged. When the KMS hinders progress towards a goal, then it not conducive to productivity.

In answer to the question "what would you say (that) would motivate people to adopt a KMS?", one participant remarked:

> *"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."* (FG4.3)

Consistent with other participants, a need for autonomy was expressed.

A comment was made by one of the SME participants, who uses a collaboration tool used as a KMS (Miro) to keep track of tasks completed or yet to be completed by all team members.

> *"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 think it is also about the application. 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 thing at certain times."* (FG4.1)

Thus, the participant implied the continued use of the tool due to sunk costs.

7.9. Obstruction of Efficient Use of Time and Resources

This theme aligns with current theories. The KMS and knowledge-sharing literature have identified a plethora of barriers to the use of KMSs, which can be roughly classified as individual, organisational and technological barriers. Of the most salient barriers to KMS use is the inefficient use of time and resources [57,85].

A constant theme throughout the discussions, regardless of the topic in question, related to the availability of Time and Resources and the need to supplement it where possible. This was especially true for the one SME, which is a private school. The teachers who took part in the interview are frequently inundated with teaching responsibilities and administrative duties (e.g., parking, writing of reports) afterwards. Thus, a common response was:

> *"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 referred to a reason for resisting the system as a result of a KMS adoption leading to less time and/or resources available.

> *"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)

Similarly, a participant from another SME also considered the reasons for 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 feedback loop which can lead to an increasing rate of resistance or non-adoption towards the system. As one person resists the KMS, another person might also resist to the point that no person is adopting the system, rendering the KMS useless.

Based on the propositions formulated from the literature in the initial framework and the mini-focus groups, the final KMS adoption framework for SMEs is depicted in Figure 2. Constructs with black bullet points are derived from the literature as part of the original conceptual framework, whereas the constructs indicated with red bullet points are the themes which emerged from the mini-focus group interviews.

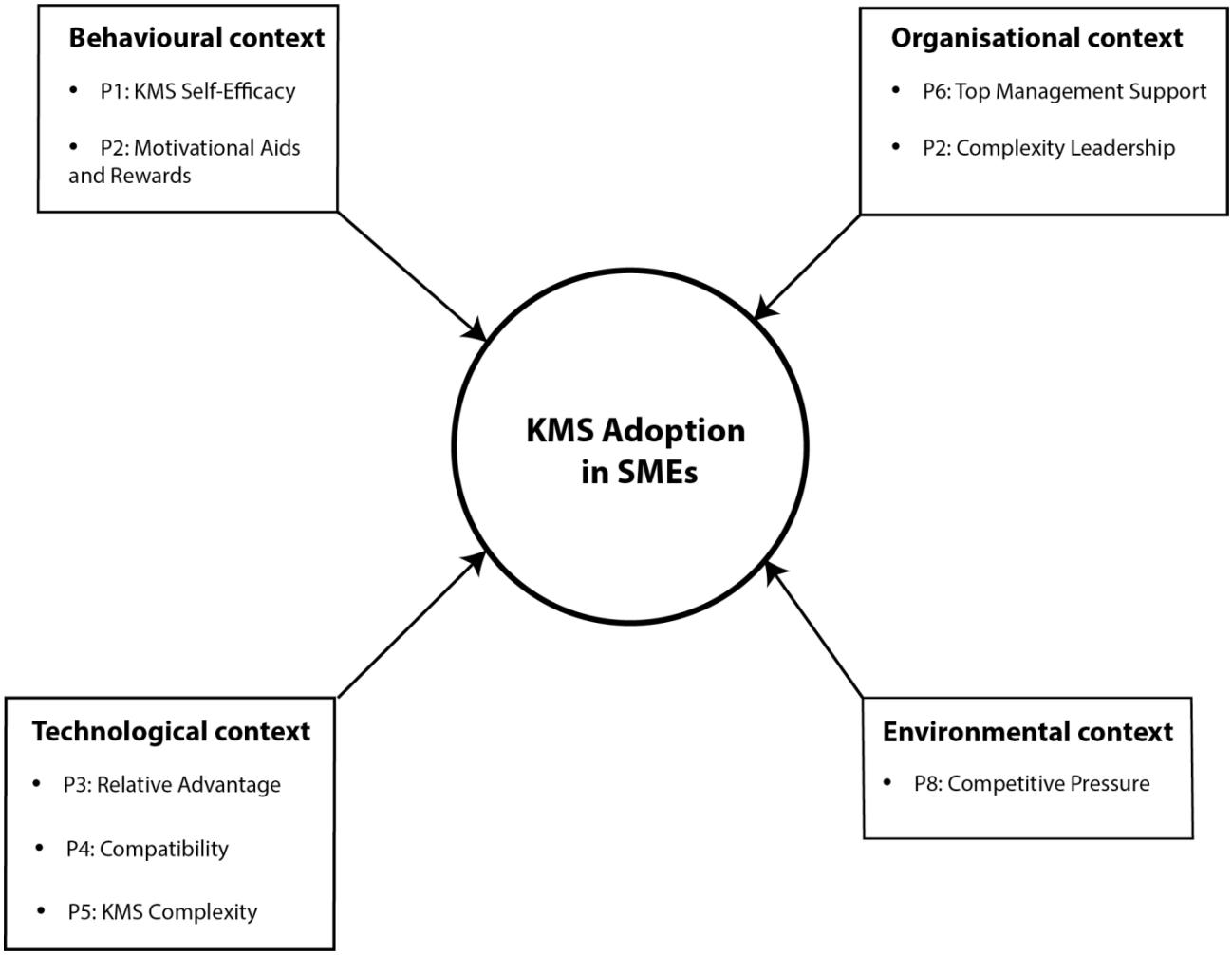

Figure 2. Preliminary framework for knowledge management system adoption.

8. Discussion

As depicted in Figure 3, an SME exists in an open system, which implies that influences (e.g., information) from outside the organisation can affect adoption, and vice versa.

Feedback between the different contexts occurs primarily between three different points to either enhance or diminish the strength between the respective contexts. Firstly, feedback between the environmental (external) context and the internal SME context. Secondly, feedback between the various contexts internal to the organization. Thirdly, feedback between the two contexts to ultimately determine KMS adoption. Implicit within the concepts of openness and the feedback loops is the idea of interdependence, where the difference contexts (e.g., the personal development context and the technological context) are influenced in a reciprocal way to either enhance or inhibit one another while also simultaneously interacting with other contexts.

The findings in this article elaborated on the discoveries in the literature regarding KMS adoption factors. The greater the anticipated effort of a system, the less usable a system will be. Therefore, there is a need for the level of effort to be similar to that of the task [35].

Top management support is seen as one of the most "unequivocal" critical factors in the adoption of information systems [78,79]. Findings in both KMS adoption models and the CSF literature pinpoint top management as playing a pivotal role in adoption.

Figure 3. A system-based view of KMS adoption in SMEs.

Whether made available by top management or otherwise, Technical support needs to be available to the user in various forms, including training, workshops and manuals ([on the KMS]) [69].

Similarly, it is important for employees to engage in purposeful and meaningful work [84]. Previous classic findings based on individual-level technology adoption models, such as those by [38,39], have found that intrinsic motivation plays a significant part in the perceived ease of use. To ensure the usefulness of an information system requires both user involvement and motivation for users in order to transfer the knowledge [85]. KMS adoption models have identified user involvement as a success factor in adoption, and greater involvement may motivate a greater desire for effort [81].

It is important for users to experience the KMS as contributing to the efficient use of their time and resources. Of the most salient barriers to KMS, one is the inefficient use of Time and Resources [57,85].

9. Practical Implications of the Findings

A number of themes emerged from the interviews not explicitly present in the literature. Although related to top management support, Top management engagement captured a more hands-on aspect by top management. Numerous themes included, either explicitly or implicitly, aspects of time and resources, with participants concerned about the KMS taking up more time than their previous way of doing things. Similarly, the new system should primarily save users time spent on tasks, as indicated by the "obstruction of efficient use of time and resources" theme. Those participants who voiced their opinions about a particular

theme felt strongly about the theme as having an influence on their ability to adopt the KMS. Thus, even the least frequently mentioned themes were expressed vocally.

At a practical level, the most prominent themes that emerged concerned the use of Time and Resources as part of KMS adoption. Should a user be able to save time and perceive the experience as efficient as part of using the system, a considerable step would be taken towards adopting the KMSs. Furthermore, physical support in the form of top management ensuring sufficient continuous resources, training and workshops is a vital component towards ensuring the use and habituation of the KMS.

10. Conceptual Implications of the Findings

Significant linkage exists between extant theory and findings. Much has been written about the "ease of use" of technology, although the numerous studies have not always been conceptualised in a similar way. Related to User experience of the KMS interface, the theme "obstruction of efficient use of time and resources" impacts KMS adoption. Similar to top management support, Top management engagement also appears consistent with the literature. Technical support shows limited citing in the KMS literature.

Four of the emergent themes, namely Purposeful work contributions, Striving for excellence, Becoming knowledgeable and motivated through empowerment and Transitional space and time from old to new systems, are not consistent with the current body of knowledge. Therefore, these themes can be further investigated in future studies to elucidate them. One of the most important themes to investigate is self-efficacy.

11. Conclusions and Limitations

This research study is embedded in the knowledge management field regarding the adoption of KMSs in SMEs. Despite technological innovations which have led to more accessible IT-based systems to facilitate KM processes, failure rates of KMSs have remained high. Numerous factors have been identified which influence KMS adoption among SMEs, although the research is still in its infancy.

Self-efficacy as a human behavioural concept provides a unique contribution in the KMS adoption literature in this study.

This research provided insights relating to the possible interaction between factors in a particular context and factors among different contexts. The study was conducted on SMEs in the Gauteng province of South Africa, but the findings do not necessarily reflect adoption trends in other regions. In addition, as the themes were identified by the researcher, the findings should be extrapolated to other contexts with caution. This study's findings are consistent with many of the findings in the literature that impact KMS adoption, such as top management support and motivation and rewards, even though numerous new themes were added to the framework, including Technical support for adoption and Top management engagement. A limitation of the study is the number of factors that were identified as part of the framework. Future research may include identifying similarities and differences of factors within larger organisations, expanding on the framework or assessing this framework with other types of IT systems. Another limitation is that data collection did not focus on specific industries or sectors. Therefore, future studies can focus on KMS adoption in a specific industry or sector. The sample consisted of mini-focus groups, thereby limiting generalizability from findings. Therefore, the framework can be tested on a larger sample size of SMEs or SMEs in particular industries, and can be applied to improve their KMS adoption success. Lastly, KMS adoption was only investigated at one particular point in time, and is thus only a snapshot of the adoption process. It is recommended that longitudinal data be collected to gain a more comprehensive picture of the factors influencing KMS adoption.

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Data Availability Statement: The data sources for the above qualitative survey are held by the lead author.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Interview Guide

Participant Demographics

Time of Interview:
Date:
Place:
Time:
Interviewee: 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.

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