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**Information Technology Capabilities Towards SMES Innovation  
Capabilities Through Knowledge Management: The Review Analysis**

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**Abstract**

**Purpose:** This study aims to explore the role of information technology (IT) competencies in enhancing innovation capabilities within small and medium enterprises (SMEs) in the service sector of the United Arab Emirates (UAE).

**Design/methodology/approach:** The study is designed as a literature review analysis, which involves systematically collecting, reviewing, and synthesizing existing research and theoretical perspectives on the relationship between IT capabilities, knowledge management (KM), and innovation in SMEs.

**Findings:** The findings indicate that IT competencies, particularly IT infrastructure, IT integration, and IT knowledge, significantly influence innovation capabilities in SMEs. Furthermore, the study confirms that knowledge management mediates the relationship between IT competencies and innovation capabilities, highlighting the importance of effectively managing knowledge assets to leverage IT investments for innovation.

**Research limitations/implications:** The study is limited to SMEs in the service sector within the UAE, which may affect the generalizability of the findings to other sectors or regions. Future research could expand the scope to include different sectors and geographic areas to validate and extend the findings.

**Practical implications:** The study underscores the critical role of IT competencies in driving organizational innovation and suggests that SMEs should prioritize investments in IT infrastructure, integration, and knowledge. Additionally, it highlights the importance of adopting effective knowledge management strategies to maximize the benefits of IT investments and foster innovation.

**Originality/value:** This study contributes to the understanding of how IT competencies enhance innovation capabilities in SMEs, particularly in the context of the UAE's service sector

**Keywords:** Information technology, capabilities, SME, Innovation, Knowledge management

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**1. Introduction**

Small and medium-sized enterprises (SMEs) are integral to national economic development, particularly in the context of today's globalised economy. These enterprises often serve as the backbone of economic growth, job creation, and innovation within a nation. However, SMEs face significant challenges in maintaining their competitive advantage amid fierce competition from new entrants in local markets and multinational corporations in foreign markets. As a result, achieving and sustaining competitive advantage has become a primary objective for SME owners and policymakers alike.

In this evolving landscape, IT competencies have emerged as critical factors influencing SMEs' competitive advantage. Despite the growing body of research linking IT competencies, knowledge management (KM), and innovation to SMEs' competitive advantages, there is still a lack of clarity regarding how these elements interact under different conditions. This study seeks to address this gap by examining the role of IT in shaping

the competitive advantage of SMEs, particularly within the service sector of the United Arab Emirates (UAE). This research is particularly relevant to the UAE, where SMEs play a crucial role in the national economy, contributing significantly to employment and economic diversification.

## 2. Background of the Study

SMEs are pivotal to both economic and social development, serving as key drivers of national progress through job creation, income generation, and fostering industry growth. Globally, SMEs represent a significant portion of the business sector, accounting for 95% to 99% of all enterprises and contributing more than 60% to 70% of total employment (Moss & Urban, 2017). The importance of SMEs in sustaining economic growth and enhancing national competitiveness has led governments worldwide, including the UAE, to implement policies and initiatives aimed at supporting and promoting SME development. Despite the critical role of SMEs, they face numerous challenges, both internally and externally. Internal challenges include limited financial resources, lack of technical expertise, and insufficient IT infrastructure, which can hinder their ability to innovate and maintain a competitive edge (DeLone, 2006; McCann & Barlow, 2015). Externally, SMEs must navigate a highly competitive environment, where they often compete with larger corporations that possess greater resources and capabilities.

SMEs recognise innovation as a key factor in enhancing their competitive capacity. People widely acknowledge that innovation can lead to long-term growth and a sustainable competitive advantage in both domestic and international markets (Schröder, 2017; De et al., 2020). SMEs in the UAE view innovation as crucial for adapting to rapidly changing market conditions and setting themselves apart from competitors. The UAE government has emphasised the importance of innovation in its national development strategies, recognising that a vibrant SME sector is crucial for reducing the country's reliance on oil and ensuring sustainable economic growth. However, innovation within SMEs in the UAE faces several challenges. Research indicates that while the UAE has made significant strides in fostering a positive attitude towards innovation, the focus has often been on large state-owned enterprises and multinational corporations, rather than SMEs (Khan, 2019; Edelman, 2014). This has resulted in a lack of comprehensive understanding of the unique innovation challenges and opportunities faced by SMEs in the UAE. The SME sector in the UAE is broad, encompassing a wide range of industries and employing a significant portion of the workforce. However, despite their size and employment contribution, SMEs in the UAE contribute relatively little to GDP in terms of value-added products, services, and exports. In 2021, the SME sector's contribution to GDP was only 11%, underscoring the need for more effective strategies to enhance the innovation and competitiveness of SMEs (Babu Das, 2019).

Small and medium enterprises (SMEs) within the service sector are pivotal to the economic fabric of many nations, including the United Arab Emirates (UAE), where they account for 89% of the SME population. Their contributions to job creation, innovation, and economic diversity are indispensable, making them a focal point for government policies and economic strategies (Mondal, 2023). Despite these contributions and the support extended by the UAE government through various initiatives like financial incentives and business incubation programs, service sector SMEs continue to face substantial challenges. A significant issue lies in the realm of information technology (IT) competencies, which are crucial for effective knowledge transfer and enhancing absorptive capacity—two key elements that underpin an organisation's ability to innovate (Ng & Hamilton, 2021; Donbesuur, Zahoor, & Adomako, 2021).

The limited learning capacity within these SMEs further compounds the challenge, restricting their ability to fully harness IT for innovation. Donbesuur, Zahoor, and Adomako (2021) have emphasised the increasing recognition of knowledge and learning as critical drivers of innovation. This recognition has shifted focus towards the development of IT capabilities, which are integral to fostering an environment conducive to

learning and innovation (Alkatheeri, Jabeen, Mehmood, & Santoro, 2021). IT, encompassing a range of tools from software and hardware to strategic planning and organisational management, is pivotal in creating a dynamic system that supports knowledge creation and enhances innovation activities (Tomo, Mangia, & Consiglio, 2020; Jayakrishnan, Mohamad, & Yusof, 2021). The advent of Industry 4.0 has further accelerated the integration of IT into business processes, presenting both opportunities and challenges, particularly for firms lacking the requisite IT capabilities (Anshari & Hamdan, 2022).

Despite the proliferation of IT applications, there remains a significant gap in understanding the multifaceted impact of IT competencies on innovation capabilities, particularly within SMEs in developing countries like the UAE (Cui, Tong, & Tan, 2022). IT competencies not only shape an organization's use of IT, but also significantly impact an SME's learning capacity and innovation capabilities. The limited exploration of this relationship in the existing literature presents a significant research gap, especially within the context of SMEs in developing economies (Ramdani, Raja, & Kayumova, 2022). Furthermore, the current literature highlights inefficiencies in the use of IT capabilities within SMEs, particularly in developing countries, where there is an incomplete understanding of how the interplay between IT capabilities influences innovation performance and knowledge management (KM) (Ajmal, Jabeen, & Vihari, 2021). While there has been some exploration into the role of IT in innovation, the focus has often been narrow, overlooking the comprehensive role that IT can play across various dimensions of innovation, including organisational, marketing, product, and process innovation (Chatterjee, Moody, Lowry, Chakraborty, & Hardin, 2020; Ravichandran, 2017; Alhajeri & Safian, 2023). This lack of comprehensive analysis calls for a deeper investigation into the complex relationship between IT competencies, innovation capabilities, and their impact on diverse organisational aspects within SMEs.

Given these challenges, there is a pressing need to bridge this gap in the literature by identifying the specific IT capabilities that are associated with enhanced innovation capabilities through effective knowledge management practices. This study aims to determine whether IT capabilities, as part of an open innovation framework, can assist SMEs in emerging markets like the UAE in overcoming their current challenges. This research seeks to investigate how internal-driven elements such as IT infrastructure (ITI), IT management (ITM), and IT-business alignment can either support or hinder an SME's ability to innovate. By addressing the identified research gap, this study will provide valuable insights into the role of IT in fostering innovation within SMEs, ultimately contributing to the broader understanding of how SMEs in developing economies can leverage IT for sustained competitive advantage.

### 3. Literature review

If we look at the history of massive organisations, it is painfully evident that a huge number of them began as small, medium-sized companies or even micro-enterprises before progressing to what they are today. IT capabilities are essential for every company, and the network's consistency is determined by adaptability and change facilitation capacity. Tafti, Mithas, and Krishnan (2013). Information technology architecture adaptability is the ability to cope with accelerated transitions to prevent increasing costs by stressing the speed of deployment. Mithas, Tafti, Bardhan, and Goh (2012) Sales are increasing and productivity is accelerating. The IT architecture enables market strategies to evolve in planning. Infrastructure adaptability allows the program operator full reign to schedule and build systems that fulfil structured targets and market investments. The study was conducted by Boucharas, Van Steenberg, Jansen, and Brinkkemper in 2010.

This helps the company achieve competitive advantages by raising sales and asset returns. Xue et al. (2013), Chung et al. (2003), and the reduction of product or cycle time in service delivery are some examples of this approach. Liu et al. (2013). Technology benefits SMEs We understand technology innovation as a strategy that gives the company a competitive edge through market diversification and new business

opportunities. Schumpeter (1942). Over the years, researchers have conducted extensive theoretical and methodological work on the use of ICT in SMEs across various fields, with a particular focus on its application. Ismail (2011), Chege, and Wang (2020). Many studies have examined the effects of ICT adoption and usage. Agwu (2018) and Oladele (2015). Jasinski (2009) explored and overcame obstacles to ICT adoption, whereas Chacko and Harris (2006) described how ICTs lead to economic development.

Information technology and the performance of information technology skills of SMEs and their applications disrupt a wide range of industries and threaten to transform existing ways of doing things and existing business models. Hamill (2015); Lorenzo et al. (2018). The development of the software systems took place in three interconnected cycles. The first step involved digitizing analogue information, encrypting it with zeros to allow computers to store, process, and transmit it. Second, IT enhances communication by utilizing new technologies such as text, talk, and social networking, and it also facilitates the digitization of market structures. Finally, IT speeds up companies' digital transition, leading to a cross-cutting systemic shift focused on the introduction of emerging technology technologies. Sources include Bloomberg (2018), Gartner (2019), Brennen and Kreiss (2016), and Bounfour (2016). The subsequent digitization of historically equivalent activities, duties, and organizational procedures has a significant impact on companies and organizations. Tarut and Gatautis (2014). The number one medium-term problem confronting companies today is designing an effective approach to digital transformation.

### *3.1 Information Technology Capabilities and SMEs*

Large information centres and specialised people were necessary to handle IT introduction and development in these organisations properly. Many businesses primarily tied the original benefits of IT adoption to increased productivity. However, in the following years, theoretical hypotheses and empirical evidence confirmed the impact on firm strategy. When IT's impact scope grew beyond the confines of large corporations, academicians became keenly interested in SMEs adopting and using technology. For example, Chege and Wang (2019) discovered that small enterprises' effective technology use possesses an important influence on their competitiveness and access to global markets. SMEs are defined differently by different industries and countries: Pula and Berisha (2015); Genc, Dayan, and Genc (2019); Jeong Hugh Han (2020). Please keep in mind that revenue determines the majority of the components, the number of employees hired, and/or the company's organizational structure. This is supported by studies conducted by Beck and Demirguc-Kunt (2007), Ahmad, Ahmad, and Abu Bakar (2018), Ayyagari, and Putu Yudy Wijaya (2020). Scholars provide both qualitative and quantitative definitions of SMEs. Some studies suggest that the term incorporates quantitative aspects such as transaction measures, employee numbers, liquidity, and fiscal and non-fiscal assets. The qualitative dimension encompasses the approach to arrangement and function efficiency (Ajmal, 2017).

The number of employees and the top and lower size limits are SMEs' crucial characteristics. Most assets define the SME cut-off range as 1-250 employees, which might include a single part-time business owner or a professional group with up to 199 members. Seyal, Yussof, Mohammad, and Rahman (2012); Seyal and Rahman (2013); J Silver, J Reeves (2016); Tomo et al. (2020) all support this definition. Other than that, SMEs carry out a variety of tasks and are autonomous, financially constrained, and owner-based, effectively overseen by their proprietors, with a highly individualized and informal structure. They have limited undertakings in their general vicinity of activities, which are heavily reliant on internal sources for funding increases. The works of Jahanshahi, Zhang, and Brem (2013), Makhouloufi, Azbiya Yaacob, Laghouag, Schilir (2015), and Ali Sahli and Belaid (2021) provide valuable insights.

Looking at the history of large organizations, we can see that most of them began as small and medium businesses, or even microenterprises, before evolving into what they are today. Therefore, the importance of

IT capabilities in any organisation lies in its adaptability and ability to facilitate change. According to Al-Lamy et al. (2018) and Chege and Wang (2020), IT infrastructure (ITI) adaptability is its ability to deal with rapid changes and avoid mounting expenses. Focusing on the speed of execution and adaptability (Rehman, Nor, Taha, and Mahmood, 2018; Rehman, Razaq, Farooq, Zohaib, and Nazri, 2020) can enhance revenue growth and profitability. Other than that, ITI fosters strategy innovation in business practices. Infrastructure adaptability allows the system developer to plan and design frameworks that meet formal goals and business investments. Bahrini and Qaffas (2019). This framework enables SMEs to improve their performance through increased revenue and asset returns. Nehemia Maletzky, Iyamu, and Shaanika (2018). Aside from that, this reduces product or service delivery cycle time. This is supported by the findings of Liu et al. (2013) and Chen et al. (2017).

It supports numerous technological innovations and organizational growth. Evaluating whether and how IT has influenced corporate performance is a crucial research topic because it helps managers assess the value of IT investments. The connection between firm performance and IT has been the subject of numerous investigations in the information systems (IS) domain. The RBV, transaction cost theory Liang, You, and Liu (2010); Hwan Jin Kim (2017); Mostaghel, Oghazi, Patel, Parida, and Hultman (2019); media richness theory Some of the theories presented to describe the extensive use of IT include Chao et al. (2020), social exchange theory, and Oparaocha (2016).

### *3.2 Innovation Capabilities in SMEs*

Most studies concluded that innovation's impact on organizational performance is critical to the survival of day-to-day operations. According to Diaz Anadon et al. (2016), innovation is the acceptance, invention, adaptation, and utilization of value-added novelty in the trade and industry realms, as well as the extension and organization of services, products, and markets that create new product development and management systems. Innovation, according to Piening and Salge (2015) and La Rocca et al. (2016), creates new outcomes by adopting new working methods and product development.

On the other hand, the goal of this new structure is to enhance and improve an organization's performance, which in turn leads to the development of new services, products, and processes. Businesses need to adapt to changing environmental demands, and people perceive innovation as a dynamic process. In an organisation's day-to-day activities and interactions, the role of innovation becomes apparent. According to the researchers, individuals or groups must be able to communicate their abilities and insights in terms of developing, encouraging, and endorsing new ideas into actions to maximize the impact of innovation. Academicians assert that a company's performance or growth serves as a measure of innovation's impact on growth. Other studies looked at the impact of technological innovation on a firm's managerial performance and used it to improve service quality and efficiency. Huang, Wu, Lu, and Lin (2016). Not all firms that invest in innovation activities can successfully advance their innovation and business performance. In other words, SMEs' ability to innovate determines their success. The study was conducted by Zawislak, Alves, Tello-Gamarra, Barbieux, and Reichert in 2012.

According to Laforet (2011), innovation can only occur if the company can do so. As per Rajapathirana and Hui (2018), a firm's IC is one of its most valuable assets for gaining and maintaining a competitive edge as well as implementing its overall strategy. The preceding literature has raised the topic of whether or not SMEs can develop via innovation. There is a link between innovation and expansion, according to most literary works. Not only can innovation help a company develop, but it also improves its services, processes, and products. Other than that, Laforet (2011) proposes that company leaders need innovation to grow, although they might have visionary potential growth strategies. According to the Oslo Manual (2005), innovation is defined as using a novel or greatly optimised product (service or good), marketing strategy,

organisational technique, or process in workplace organisations, business practice, or external relations. To increase performance, an organisation might make various modifications to work practices, outputs, and production variables. Innovations Process, Innovation Products, Marketing Innovations (MI), and Organisational Innovations (OI) are among the four categories identified by the Oslo Manual OECD (2005). Below is a list of descriptions for each category.

### 3.3 Organisational Innovations

Various definitions exist to describe the OI concept. For example, OI can be defined as the formation and implementation of a novel state-of-the-art management practice, structure, process, or technique to advance the organisation's goals. Birkinshaw et al. (2008), Hamel et al. (2014), and Snowdon and Alessi (2018) have all contributed to this definition. According to Damanpour Fariborz and Evan (1984) and Damanpour and Evan (2006), administrative innovation is an innovation that takes place in an organization's social system (for example, new rules, procedures, roles, and structures). According to Hamel (2006), management innovation is a considerable departure from standard management practices, methods, and concepts, as well as a break from traditional organisational forms that dramatically alter management performance. This study employed Damanpour and Aravind's (2012) concept of OI, which defines it as "new methods in knowledge for conducting management jobs as well as new processes that result in alterations in the organisation's administrative procedures, strategy, structure, and systems."

As a result, it should improve the organisation's cooperation, coordination, information sharing, learning, collaboration, and innovativeness. Gunday, Ulusoy, Kilic, and Alpkan (2011). According to the socio-technical system theory, any change in an organization's technological system necessitates modifications in the administrative system to meet the needs that the technological system creates. To put it another way, OI is a prerequisite for fully implementing and exploiting technological innovation. According to Fagerberg and Mowery (2009), an organisation's ability to innovate is a prerequisite for the effective implementation of new technology. In terms of organisational changes (for instance, communication, practices, policies, and structural improvements), OI can result in improved intra-organisational cooperation, including coordination, which can foster the use and adoption of innovations. Damanpour Fariborz and Evan (1984). According to Damanpour et al. (1989), adopting changes in an organisation's administrative components is required to implement innovations (OI) successfully.

Furthermore, enterprises should adopt new organizational structures, business models, and equivalent procedures (if not more) in order to profit from innovations. Teece (2010) and (2018). Damanpour Fariborz and Evan (1984) undervalue the significance of OI in new developments or innovations. Only a few academicians have attempted to investigate the complicated links across invention types since Camisón and Villar-López (2014) and Damanpour Fariborz and Evan (1984). To support card catalogue system digitalisation (technological innovation), Damanpour Fariborz and Evan (1984) emphasize the necessity of training catalogue workers and designing new methods for classifying library contents (OI).

Other than that, Gunday et al. (2011) discovered that OI (establishing a new organisational structure to foster teamwork as well as a project-type organisation and bringing in a new human resources management system) results in improved cooperation mechanisms. This includes intra-organisational coordination, which establishes a suitable environment for the adoption of innovation processes in empirical research conducted on Turkish firms. Furthermore, establishing an industrial research laboratory as an OI has resulted in numerous patented breakthroughs for general electricity throughout the years, according to Hamel (2006). Hence, adopting OI improves a company's overall innovativeness. Gunday et al. (2011) led to rapid market growth. Deloitte (2017); Rajapathirana and Hui (2018).

### 3.4 Information Technology Capability

Globalisation, as well as the revolution in information and communication technologies (ICT), have combined to cause a major structural transformation in the international economy. Hamari, Sjöklint, and Ukkonen (2016). The new economy regards the outcome of these two trends as a superior economic framework. Furthermore, it has established new regulations and methods of conducting business, with IT playing a central role. IT automates business operations, reduces costs, and enables internationalisation. Li et al. (2006). It makes it possible to advantage over globalisation's opportunities.

Additionally, electronic connections within and between firms change how corporations buy and acquire inputs or factors associated with those inputs, process them into services, including products, and then disseminate the results to clients (Melville, Kraemer, and Gurbaxani, 2017). In other words, IT permeates every aspect of business. According to Crawford et al. (2011), the primary problem for businesses considering IT is accurately defining and determining it. The most common means of conceiving IT inside businesses is via IT capability. Tippins and Sohi (2003), as well as Chakravarty et al. (2013), have contributed to this understanding. Note that IT capability refers to a company's ability to effectively manage information resources via technology (Tippins and Sohi, 2003). IT capability is a company's ability to use IT to meet its information needs. Mithas and Erformance (2011). The three categories of IT capability—ITO, ITK, and ITI—all contribute to the efficient use of IT resources. Crawford, Leonard, and Jones (2011).

First, ITK refers to how well a company understands current and emerging technologies, as well as how well its employees can use computer-based technology. Second, ITO is concerned with the IT-based procedures, strategies, and processes needed to produce a technology that adds value. In other words, they are business activities supported by IT. Third, ITI refers to the resources and tools that aid in the capture, dissemination, storage, processing, and use of information, as well as the technology itself. Other than that, ITI involves software, hardware, and support personnel (Pérez-López and Alegre, 2012), including the firm's investment level in IT. Crawford, Leonard, and Jones (2011). According to Pérez-López and Alegre (2012), IT capability is how a company employs technology to manage its information efficiently. Finally, IT management (ITM) refers to an organization's ability to efficiently carry out IT-related tasks, such as system development, project management, and IT evaluation and control. M. Zhang, Sarker, and Sarker (2008).

### 3.5 IT capability and innovation capability

Over the past ten years, there has been a growing interest in the utility and value of IT for businesses. Most academics, meanwhile, were unable to demonstrate a direct link between IT and economic performance. Pérez-López and Alegre (2012) claim that the authors' unwillingness to see other organisational capacities as important intermediaries between IT and performance is the root of the discrepancy. The majority of IT research has focused on the factors that influence IT adoption (Bayo-Moriones and Lera-López, 2007). The factors that have been analyzed can be divided into three groups: factors related to the staff members of the firm that use IT, factors related to the firm itself, and factors related to the firm's business environment (Ollo-López and Aramenda-Muneta, 2012). The strong correlation between these dimensions indicates a positive connection between company success and innovation (Leitner et al., 2016; Birkner and Mahr, 2016).

Earlier guidelines provided guidance on how to use digital data for innovation after gathering crucial information, potentially leading to appropriate regulations and standards that prevent automation of innovation. In the modern economy, a company's ability to be innovative is essential to its ability to endure, grow, and compete (Kmieciak, Michna, and Meczynska, 2012). Besides, innovation is the only sustainable strategy to stay competitive (Kmieciak, Michna, and Meczynska, 2012). Kmieciak et al. (2012), for instance, developed two business objectives. First, there was the question of how to continue and foster innovation. The

second topic revolved around the relationship between non-financial and financial business performance and innovation. Gaining a competitive edge and enhancing company performance are the two main goals of innovation. These researchers have produced a heterogeneous body of empirical work on the positive association between innovation and FP (firm performance).

The study systematically collects, reviews, and synthesizes existing research and theoretical perspectives on the relationship between IT capabilities, knowledge management (KM), and innovation in SMEs. The literature review involves identifying and selecting relevant academic articles, books, and other scholarly sources that discuss IT capabilities, knowledge management, and innovation in SMEs. We select the sources based on their relevance, their contribution to the topic, and their credibility in the academic community. We conduct a comprehensive search across various academic databases (e.g., Google Scholar, JSTOR, Scopus) using specific keywords related to IT capabilities, knowledge management, innovation, and SMEs. The search includes both recent studies and seminal works to ensure a thorough understanding of the topic.

The study establishes criteria for including or excluding sources to ensure the quality and relevance of the reviewed literature. Inclusion criteria might include peer-reviewed journal articles, studies focussing on SMEs, and papers discussing the intersection of IT, KM, and innovation. The exclusion criteria could include outdated studies or research that is not directly relevant to SMEs or the specified topics. We synthesize the selected literature to identify patterns, themes, and gaps in the existing research. The study critically analyses how IT capabilities influence innovation through knowledge management in SMEs, highlighting key findings, theoretical frameworks, and empirical evidence from previous studies.

The literature review organises and presents the findings in a structured manner, often categorising them by themes such as the impact of IT capabilities on innovation, the role of knowledge management as a mediator, and the specific challenges and opportunities faced by SMEs in leveraging IT for innovation. The literature review helps to build or refine a theoretical framework that explains the role of IT capabilities in enhancing innovation through knowledge management practices within SMEs. The study may also propose new hypotheses or models based on the gaps and inconsistencies identified in the literature.

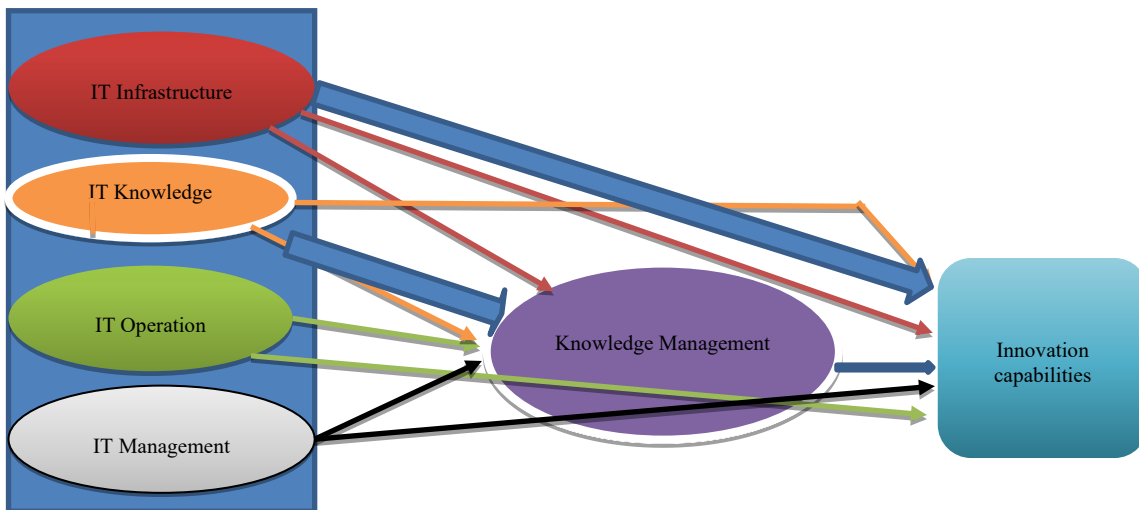


Figure 2.1: Conceptual Model



In summary, a comprehensive literature review serves as the foundation for this study's methodology, enabling the researchers to gather and analyse a wide range of existing knowledge on IT capabilities, knowledge management, and innovation in SMEs. This approach establishes a robust theoretical framework to comprehend how IT fosters innovation in SMEs by implementing effective knowledge management practices, and pinpoints areas requiring additional research.

#### 4. Discussions

The discussion emphasises that IT capabilities are a critical enabler of innovation in SMEs. IT infrastructure, tools, and systems allow SMEs to streamline operations, enhance communication, and access vital information quickly. These capabilities facilitate more efficient processes and empower SMEs to innovate by fostering creativity, collaboration, and the swift adaptation to market changes. The study highlights that IT capabilities, such as data analytics, cloud computing, and digital platforms, offer SMEs the ability to harness large amounts of data, leading to more informed decision-making and innovative solutions tailored to customer needs. The first key finding demonstrates:

##### 4.1 IT Capabilities and Knowledge Management

Knowledge management (KM) has gained popularity because of an increasingly clear understanding of the importance of knowledge for an organisation's growth and survival. As a result, M. Polanyi (1966) distinguished between explicit and tacit knowledge as the two essential components of knowing. Because it is difficult to digest, implicit information requires a sophisticated understanding process that is challenging to understand (Davenport & Prusak, 1998; Davenport, 2008). People can gauge it by looking at their perceptions, mental faculties, and abilities. Individuals within the company can transmit knowledge through conduct, attitudes, experiences, and practices (Coulson-Thomas, 2004).

Conversely, explicit knowledge, as defined by Goh and Hooper (2009), is knowledge that can be readily expressed, disseminated, and codified in fact sheets, manuals, diagrams, drawings, and charts, among other formats (Nonaka, 2008; Nonaka and Nonaka, 1994). Owing to its multifaceted nature, knowledge management is defined variously in practice. For example, Chawla and Joshi (2010) define knowledge management (KM) as the process of evaluating and locating easily accessible information needed to achieve organisational objectives.

Knowledge management (KM) encompasses the gathering, sharing, and application of readily available knowledge, as stated by Darroch (2005). Furthermore, scholars have examined knowledge management (KM) as a means of acquiring, exchanging, understanding, and utilising knowledge. The learning process aligns all actions with the organisation's strategies (Kiessling, Richey, Meng, and Dabic, 2009). Additionally, KM is defined by Bhatti and Qureshi (2007) as an effort to research the explicit and tacit knowledge of people, groups, and organisations in order to transform these riches into organisational assets that managers may utilise to make decisions. For decades, managers and academics have focused on IT development and knowledge management to achieve a CA. The introduction of IT-enabled KM capacity (KMC) as a critical ability for businesses to enhance human performance, innovation, and organizational capacities, as well as a CA, is becoming more and more significant in today's rapidly changing world (Joshi et al., 2010; Tseng, 2014).

KMC is an organization's process-based capacity to both mobilize and use knowledge-based resources in order to achieve a CA. In an effort to become a knowledge-based organisation, Siemens, a German electronics and engineering company, has invested heavily in its share net KM system to improve business processes and provide customer value (Nielsen and Ciabuschi, 2003). Furthermore, the development and widespread use of

IT, particularly communication networks like the Internet, has reduced costs and increased collaborations. This has made it possible to store, gather, and share knowledge in a safe, quick, and easy way (Mohamed, Stankosky, and Murray, 2006).

IT can help KM obtain a CA certification. According to the 2015 Knowledge Management Priorities Report, 61% of organisations are hopeful about the future of KM projects, and 93% of organisations have budgets specifically set aside for KM (APQC, 2015). Further research into the interaction between KM and IT is necessary, according to the report, because it is not clear how technology investment fosters KM. However, the previous study identified three research deficiencies. First, more research is necessary because previous studies have left the connection between KMC and other IT resource types unclear.

According to RBV, IT is a significant, remarkable, and flexible organisational resource that enables a deep and wide flow of knowledge for high KMC (Bharadwaj, 2000; Alavi and Leidner, 2001; Wade and Hulland, 2004a). However, the findings point to a connection between IT and KM. Certain academics assert that IT applications, particularly the KM system (Alavi and Leidner, 2001) (Joshi et al., 2010), have the potential to enhance an organization's Knowledge Management Capability. As IT becomes more potent, many businesses are consequently investing more in the technology aspect of knowledge management and related processes (Iyengar, Sweeney, and Montealegre, 2015).

However, according to Mohamed, Stankosky, and Murray (2006), there is no correlation between the use of technology and the success of knowledge management projects. Moreover, there remains a lack of clarity regarding the various IT resources that have the potential to enhance Knowledge Management Communication. People commonly conceptualize it as a specific dimension, like IT use (Iyengar, Sweeney, and Montealegre, 2015), or as a second-order variable (Pérez-López and Alegre, 2012). Conversely, different kinds of IT capabilities have unique qualities that could result in differing outcomes and levels of efficacy (Wade and Hulland, 2004a). For example, the IS infrastructure has high levels of replication and ability suitability, whereas the IS-business partnership has low to medium levels of these characteristics (Wade and Hulland, 2004a).

Consequently, IS infrastructure and IS-business relationships may generate varying degrees of KMC. This creates a research gap that requires filling. Second, prior studies have not comprehensively examined the circumstances under which the effects of trick resources on KMC vary, nor the technology and social-managerial components of KM. Earlier work offered two different research avenues on the effects of trick resources. Tanriverdi (2005) asserts that systems, infrastructure, and methodology enable knowledge management procedures.

Technological systems within an organisation can influence the acquisition, sharing, and retention of information (Gold, Malhotra, and Segars, 2001). In order to improve knowledge management (KM), Tanriverdi (2005) emphasised the necessity of a thorough social, managerial, and technical perspective. Be aware that conventional RBV researchers argue that there are not enough resources needed for knowledge management (KM) (Chen et al., 2014). The second key finding and discussion is as follows:

#### *4.2 Knowledge Management and Innovation Capability*

Knowledge is defined as a justified personal conviction that strengthens an individual's capacity to conduct successful action (Lopes, Scavarda, Hofmeister, Thomé, and Vaccaro, 2017). The KMCs arose from KM procedures such as retention, acquisition, application, and sharing (Akram, Goraya, Malik, and Aljarallah, 2018). KMCs are the foundation for the development and management process of IT capabilities (Mugellesi Dow and Pallaschke, 2010). Note that KMC is a byproduct of ITI and IT competence (ITC) and a critical component of achieving sustainable competitive advantage (SCA).

In other organisational circumstances, the information needed to reach their goals and SCA is already in place, but there is a scarcity of ITC in mobilising the appropriate performance. Therefore, we assume that the company's database already stores the necessary knowledge to develop productive capability. However, an inefficient procedure that prevents the mobilization of information can lead to an unsustainable firm-wide CA (Mahdi, Nassar, and Almsafir, 2019). A lack of knowledge about management strategy and its integration with other organisational operations may be the cause of this ineffectiveness (Lopes et al., 2017). This study suggests that firms should rely on internal knowledge to address inefficiencies, while also leveraging external knowledge. Naqshbandi and Jasimuddin (2018) assert that the outside world can occasionally provide innovation. KM can spark open innovation, and successful organisations achieve CA by developing innovative capacities (Naqshbandi and Jasimuddin, 2018).

Other than that, innovative capabilities can help firms acquire CA and stand out from the competition. Samsung, Amazon, and Apple are excellent examples of this type of company. Aside from the CA, the economic value of an organisation's products improves when it is sustainable and innovative, attracting more customers (Gaziulusoy, Boyle, and McDowall, 2013). As a result, innovation drives corporations to discover or realise what others have not, leading to competitive advantage for long-term businesses. In addition, IT generates a significant volume of data. We must sort and process the information. This useful and relevant data could lead to new insights and, in turn, organisational knowledge development. Note that perceived, inferred, discovered, or understood information is what knowledge is basically about (Nonaka, 1994a; Akram et al., 2018). Different types and categories of knowledge exist (Nonaka, 1994a). Any modern company that wants to attain SCA must have knowledge in some form, whether explicit or tacit (Muthuveloo, Shanmugam, and Teoh, 2017). Organisational KM adoption enables businesses to develop more competitive and innovative services and products. Apart from that, most businesses seek to acquire current technologies as part of the technology adoption race.

However, only a handful of businesses effectively extract and manage their knowledge resources through technology. IT can help businesses improve their performance and achieve SCA. They obtain SCA while also lowering costs for business models that can increase income, facilitate various procedures, and drive innovation (Mao, Liu, Zhang, and Deng, 2016). Nevertheless, other academicians opined that investing in IT can raise a firm's spending costs, causing it to lose its SCA in the market (Neirotti and Raguseo, 2017). Because IT has become identical and global, it has become reasonably easy to replicate other firms' ITC (H. C. Chae, Koh, and Prybutok, 2014). KMCs are important for improving organisational performance, according to KM and IT specialists (Naqshbandi and Jasimuddin, 2018; Lee and Choi, 2003). KM is a discipline and function that involves the acquisition, creation, codification, and sharing, as well as the use of knowledge to improve corporate performance and creativity (Shujahat et al., 2019).

Apart from that, the KM processes and the KM environment are the two fundamental components of KM. The crucial component is the KM process, which generates knowledge and persists without official organisational support. The foundation of industrialized economies has been transformed from physical resources to intellectual assets. Therefore, business leaders must reassess the management and cultivation of information within their organisations (Omotayo, 2015). The theoretical lens of Knowledge Management (KM) encompasses actions related to exploiting knowledge processes, such as knowledge creation, sharing, storage, and use (Hutchinson and Quintas, 2008; Soto-Acosta et al., 2018). In the twenty-first century, KM has emerged as one of the most popular topics among practitioners and academicians. At the strategic level, KM methods substantially influence an organisation's financial performance and competitiveness (Kianto et al., 2013; Liu, Xu et al., 2020). The operational level has recognized the value of KM in process improvement (Choo et al., 2007; Andersson et al., 2020).

According to Han and Park (2009) and Hu et al. (2019), knowledge is entrenched in the business process, and the use of knowledge is regarded as a component of organisational members' everyday work. Meanwhile,

Ghiorghita (2017) stated that using KM methods effectively assures firms of continual process improvement. KM systems, tools, and technologies enable businesses to store, record, and share knowledge, thereby supporting process improvement (Becerra-Fernandez, 2010; Ratwiyanti et al., 2020). Organisations must utilise KM methods to accomplish business process improvement, according to Massingham and Al Halaibi (2017). Businesses can eliminate waste points and enhance workflow efficiency by integrating KM into their processes.

To help with KM practices, researchers have made a lot of frameworks and models on how knowledge is created, transformed, and used (Heisig, 2009; Girard and McIntyre, 2010; Hu et al., 2019). Choo and Bontis (2002) and Roos (2017) say these are the best and most important models in the KM field. For example, Nonaka (1994b) and Koehler et al. (2019) identify two types of knowledge based on Polanyi's (1966) concept: tacit knowledge (knowledge embedded in actions and contexts) and explicit knowledge (which is the knowledge that can be described in words and easily transmitted).

Note that socialisation, externalisation, combination, and internalisation are the four conversion processes depicted in the well-known SECI (socialisation, externalisation, combination, and internalisation) model for generating and using these two types of knowledge (Nonaka, 2009; Koehler et al., 2019). Tacit knowledge transmission has a greater effect on performance than explicit knowledge exchange, yet it is sometimes difficult to communicate tacit knowledge across persons (Nagati and Rebolledo, 2013; Asgari et al., 2015). According to a recent study, Web 2.0 and social media usage may help organisations and supply chain members share expertise (Irani, Sharif, Papadopoulos, and Love, 2017).

Knowledge management practices (KMP) can produce competent supply and demand skills (value creation) to boost enterprises through information discovery and innovative techniques. Farooq (2019). KM functions foster innovation and functional outcomes (Lawson, Samson, and Roden, 2012; Kanto, Ritala, Spender, and Vanhala, 2014). As a result, companies that use knowledge management (KM) techniques, such as innovation, development, and knowledge sharing, witness growth, the creation of new business models, and the establishment of a legitimate position in their industry.

Knowledge networks have the potential to help organisations, society, the environment, and the economy as a whole (Lopes et al., 2017). It should be noted that an organisation creates knowledge activities as part of a suitable strategy to interact with the environment (Dayan, Heisig, and Matos, 2017), which results in SCA (Skyrme and Amidon, 2017). The variety of knowledge management (KM) techniques is critical for improving organizational general and technical capacities and influencing innovative practices (Clemons, 2014). Knowledge management (KM) enhances the formality of obtaining knowledge, experience, new skills, competence, and the value provided to customers by promoting innovation practices. The results of this strategy can assist businesses in increasing their level of knowledge and competence as well as their level of innovation (Scarborough, Robertson, and Swan, 2015). Ferreras-Méndez et al. (2015) gathered customer sustainability experiences, and their innovative capacities persisted over time.

This paper examines knowledge management (KM) strategies from four angles, drawing on the research of Valmohammadi and Ahmadi (2015). (knowledge acquisition, generation, sharing, and storage). Furthermore, according to Damanpour et al. (2009) and Ben Zaied et al. (2015), a firm's capacity for innovation is influenced by its knowledge resources, which are linked to innovation. Wilson (2007) defines innovation as the application of knowledge to create new products, services, practices, and processes. The research cited above recognises the influence of knowledge management (KM) on the procurement, application, and dissemination of innovations. Aside from that, knowledge acquisition is the utilisation of previously acquired knowledge or the discovery of new information; it is the acquisition of knowledge that is accessible. Lee and Lin (2005). The organisation can gather knowledge internally by adding tacit knowledge from its staff members or explicit knowledge from previously published papers to its repositories.

In addition, Yew Wong and Aspinwall (2004) suggest that a business can acquire knowledge by investing in knowledge assets like research papers and patents and by employing individuals with the requisite expertise. Additionally, direct and quicker knowledge flow from human interactions with customers may help business managers better get information on market trends, competitor activity and behaviour, customer understanding, and other changes (Yew Wong and Aspinwall, 2004). Employee capacity expands as a company gains new knowledge, enabling them to apply that knowledge to create original concepts (Chen and Huang, 2009). As a result, knowledge banks expand, and businesses can take advantage of new opportunities by applying and putting into practice recently acquired knowledge to create creative excursions (Huang and Li, 2009).

Scholars have confirmed the link between innovation and information acquisition. For instance, Zhang et al. (2010) found that alliance partners' information impacts knowledge development within companies, potentially leading to innovations. According to CL Tan (2010), knowledge acquisition and technological innovation (process and innovation product) have a strong and beneficial relationship. Mafabi et al. (2012) found a positive and substantial correlation between OI and knowledge acquisition. Knowledge sharing refers to the cross-organisational exchange of skills, knowledge, and experiences (Lin, 2007). Members of the organisation communicate and share information that may encourage further involvement. This encourages the growth of creative thoughts (J. W. Huang and Li, 2009). As a result, we could presume that innovation and information sharing have a positive association. Lastly, Alavi and Tiwana (2002) suggest that effective application of learned information in business decisions requires receptiveness to knowledge, also known as knowledge application. Therefore, the application of knowledge may promote original thought.

Evidence from numerous research papers indicates a substantial correlation between KM and innovation. However, Xu et al. (2010) argued that the management of knowledge might influence the success of corporate innovations. Additionally, Amalia and Nugroho (2011) demonstrated how an efficient KM process facilitates knowledge development, diffusion, storage, and application, all of which support business innovation. CL Tan (2010) and Allameh and Abbas (2010) found a correlation between the efficacy of knowledge acquisition, application, sharing, and innovation products. In SMEs, we looked into the aforementioned relationships using data from an empirical study. For instance, in the high-tech SME industry, Alegre et al. (2013) found a strong and positive correlation between innovation and knowledge management. Price et al. (2013) revealed that SMEs can innovate with the support of the KM method. According to Honarpour et al. (2018), knowledge management (KM), which encompasses knowledge diffusion, application, and acquisition, positively impacted the innovative products and processes of Malaysian firms.

Furthermore, Valmohammadi et al. (2019) found a correlation between innovation practices and the sustainability of organisations and knowledge management practices through the four functions of invention, acquisition, storage, and sharing. Guzmán et al. (2012) found similar results in Mexican SMEs. Nguyen et al. (2011) note that there is a dearth of research on the application of KM in SMEs, especially in developing countries. According to Tee et al. (2012), more investigation is required to expand empirical study on the relationships between innovation and knowledge management in SMEs. It is necessary to investigate the interactions amongst Rwandan SMEs because there is a dearth of study on the topic.

People discuss knowledge management as a crucial mediator between IT capabilities and innovation. Effective KM practices enable SMEs to capture, store, share, and utilise knowledge gained through IT systems. This knowledge transfer and utilisation are key to fostering a culture of continuous learning and innovation. The study suggests that SMEs with strong KM practices are better positioned to translate IT investments into tangible innovation outcomes. These firms can leverage IT to create, share, and apply knowledge, leading to the development of new products, services, and processes that drive competitive advantage.

The discussion explores the synergistic relationship between IT capabilities and KM, arguing that their combined effect is greater than the sum of their parts. While KM practices ensure the effective use of IT-generated knowledge to spur innovation, IT capabilities provide the necessary tools for effective knowledge management. According to the study, SMEs that combine IT capabilities with robust KM strategies are more likely to experience enhanced innovation capabilities. This integration leads to the development of new ideas, improved problem-solving abilities, and the creation of value-added products and services.

The discussion also addresses potential challenges SMEs may face in integrating IT capabilities with KM practices. These challenges include limited resources, lack of expertise, and resistance to change. The study emphasises the need for SMEs to overcome these barriers to fully realise the innovation potential of IT and KM integration. The discussion suggests that SMEs need to invest not only in IT infrastructure but also in developing the skills and culture necessary for effective knowledge management. This includes training employees, fostering a culture of collaboration, and ensuring leadership support for KM initiatives.

In summary, the discussion section of the study connects the theoretical insights gained from the literature review with practical implications for SMEs. It argues that the integration of IT capabilities with knowledge management is crucial for fostering innovation in SMEs. By addressing the challenges and providing actionable recommendations, the study offers a comprehensive understanding of how SMEs can leverage IT and KM to enhance their innovation capabilities.

## **5. Conclusion**

The study concludes that the integration of Information Technology (IT) capabilities with Knowledge Management (KM) is crucial for enhancing innovation capabilities within small and medium-sized enterprises (SMEs). IT capabilities provide the necessary infrastructure for efficient knowledge handling, while KM practices ensure that this knowledge is effectively utilized to drive innovation. The synergistic relationship between IT and KM fosters a culture of continuous learning, creativity, and adaptability, enabling SMEs to develop new products, services, and processes that contribute to their competitive advantage. The study provides practical recommendations for SMEs aiming to enhance their innovation capabilities through IT and KM integration. It suggests that SMEs should focus on developing IT systems that support knowledge sharing and collaboration while also investing in KM practices that facilitate the effective use of IT-generated knowledge. The discussion highlights the importance of aligning IT and KM strategies with the overall business goals of the SME. By doing so, SMEs can ensure that their investments in IT and KM lead to sustainable innovation and long-term competitive advantage. The study concludes the discussion by identifying gaps in the existing literature and suggesting areas for future research. It calls for more empirical studies to validate the proposed model in different SME contexts and industries. Additionally, the study encourages research into the specific IT tools and KM practices that are most effective in driving innovation in SMEs.

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