The Mediating Role of Knowledge Management in the Relationship between IT Capabilities and Innovation Capabilities

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Abstract

Background: Small-medium enterprises (SMEs) manufacturing has been regarded as the pillar of the nation's economic development, especially in developing countries. However, this vital sector faces unprecedented challenges of intense global competition, rapid technology change, and consumer behaviour change. The literature suggests that information technology capabilities significantly influence the development of SMEs through facilitating knowledge transfer, which is the key driver for innovation development. However, past studies paid attention to large corporations rather than SMEs, which leaves a gap in what IT capabilities are and how IT capabilities interaction with knowledge management can influence innovation capabilities.

Objectives: The main goal of this paper was to find out if information technology capabilities, which are part of open innovation, help small and medium-sized businesses (SMEs) in a developing market, in this case the United Arab Emirates (UAE), to be more innovative.

Methods:A quantitative approach was used. Meanwhile, a survey was employed to gather information. As an exogenous variable, knowledge management (KM) was discovered as a mediating variable in this study. Finally, an indigenous variable was added: inventiveness.

Results:IT has an impact on knowledge management, including knowledge dissemination, knowledge management, and knowledge application, according to this study. IT capabilities have also been found to affect product innovation. Meanwhile, knowledge management serves as a bridge between ITC and product development.

Conclusions: The purpose of this study is to find out which information technology capabilities (ITC) are linked to improved knowledge management (KM) and innovation capabilities in small and medium-sized businesses (SMEs). Because of their considerable contribution to the economy's gross domestic product (GDP) and employment generation, SMEs are seen as the economy's fortitude. However, this vital industry faces significant challenges, including fierce rivalry, short product life cycles, technological change, and shifting customer behaviour.

***Keywords**:*Information Technology,Innovation Capability, Knowledge Management, SME Manufacturing, UAE.

1. Introduction

Small and medium-sized enterprises (SMEs) are deemed vital to socio-economic growth. SME functions are represented in the development of employment and income, a better trade

balance, and the primary mechanisms for increasing and revitalising the national economic establishment through job creation and income generation. Furthermore, SMEs serve as the industry's basic foundation for growth. SMEs currently comprise the majority of large corporations (KO Oduntan 2014). SMEs are defined as a significant type of business, accounting for 95–99 percent of all firms and creating more than 60–70 percent of new jobs (Moss and Urban 2017).As SMEs continue to thrive, a country's economy develops gradually and sustainably. Many governments establish government initiatives to assist and develop SMEs in order to boost the country's competitiveness.

On the other hand, SMEs continue to face several challenges, including competition from within and outside the nation (Distanont and Khongmalai 2018). In many ways, SMEs vary from huge corporations (Ramdani, Chevers, and A. Williams 2013). For instance, SMEs are more highly regulated, but they are less likely to hire experts (James 1999; Thong 2015). SMEs are thought to focus on more broad abilities, and they may lack both IT knowledge and technical competence to comprehend and benefit from its advantages (DeLone 2006). Furthermore, since SMEs have little financial resources, they are hesitant to invest in major technical knowledge or information technology (IT) infrastructure (McCann and Barlow, 2015) because they recognise that they may have limited financial resources and management to address any issues (Joseph, 2016). For SMEs, innovation is critical to increasing capacity and establishing a competitive advantage (Schröder 2017).De et al. (2020) say that innovation can lead to long-term growth and advantages in both internal and external markets.

The GE Global Innovation Barometer (Edelman, 2014) is the first study of major global research on innovation to comprise over 3,200 executives in 26 nations (Pervan, Al-Ansaari, and Xu, 2015). The United Arab Emirates (UAE) is one of the nations taking part in this worldwide study. However, the questionnaire only covers international and multinational companies functioning in the country and large state-owned enterprises in aerospace, environment and energy, logistics, and transportation. It does not accurately reflect small and medium-sized businesses' attitudes toward innovation. According to B. Edelman's (2014) report, the UAE is a nation with high awareness and a positive attitude toward innovation (Khan 2019).

The GE Global Innovation study emphasises that innovation is progressively becoming a global game. The only way to innovate effectively is to merge and combine ideas, skills, resources, and insights from across the world. However, innovation must be tailored to meet the demands of specific markets (Edelman, 2014). Big data, collaboration, the internet of things (IoT), as well as the industrial internet were highlighted as important catalysts for innovation by the executives. Innovation is seldom a one-way process; it is a highly dynamic and multidisciplinary method that entails collaboration between a diversified and developing network of institutions, stakeholders, and users (OECD 2010).

The key driver for knowledge is IT has received considerable attention for innovation, which is the backbone of SMEs' competitive advantage. Information technology is not only the hardware that is based on a resource. It is a combination of software and hardware capabilities, besides organisational management and strategy (Chi et al., 2017; Lee et al., 2015). The utilisation of IT capabilities in the UAE SME is inefficient because it is deficient in how IT capabilities influence knowledge management and innovation performance. This brings an opportunity for further exploring and conceptualising IT capabilities that cope with SMEs in the UAE since most past studies focused on large corporations (Im and Rai 2014; Mithas and Rust 2016).

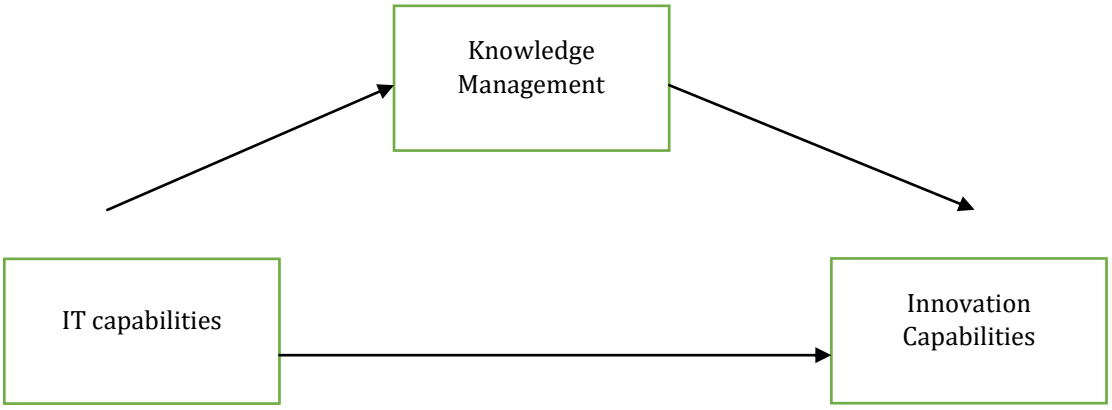
2. Objectives

In addition, an earlier study concentrated on developed nations' use of open innovation to facilitate technology's flow and information among key stakeholders. Still, the topic is now

being examined in underdeveloped nations (Hossain 2013). This study aims to see if information technology capabilities, as part of open innovation, can help SMEs in an emerging market innovate, specifically in the UAE. This paper will bridge the research gap in SMEs in developing countries by providing a model that assists SMEs in attaining their competitive advantage and contributing to the extension of resources based on the view approach by conceptualising intangible resources as IT capabilities that influence firms' performance. Since the key driver for competitive advantage is innovation, this research can add value to general knowledge in general and innovation literature. The main goal of this paper was to find out if information technology capabilities, which are part of open innovation, help small and medium-sized businesses (SMEs) in a developing market, in this case the United Arab Emirates (UAE), to be more innovative.

3. Methods

This paper's central aim was to investigate whether information technology capabilities, as a component of open innovation, encourage innovation in small and medium-sized enterprises (SMEs) in a developing market, specifically in the United Arab Emirates (UAE). A quantitative method was adopted. Meanwhile, a survey was used as a data collection tool. As shown in Figure 1, information technology capabilities (ITC), the aim of this research was identified as an exogenous variable, with knowledge management (KM) as a mediating variable. Finally, innovation was introduced as an indigenous variable.



Terms Definition

The term "information technology capabilities" includes the possession of information technology (IT) and its proper application for addressing business information demands (Mithas and Erformance 2011). First, ITC is expressed as the way that firms use IT in order to effectively administer information resources (Tippins and Sohi 2003), which includes even items derived from three sub-constructs as shown in table 1, which are IT knowledge, IT operations, and IT infrastructure that help the utilisation of IT investments (Crawford, Leonard, and Jones 2011).

Second, innovation capabilities, which refer to the mediator, are expressed as a firm's capabilities to implement a new or considerably better process, product (good or service), marketing strategy, or organisational method in the business workplace, organisational practice, or external relations (Manual 2005, p. 46). Table 1 shows that innovation capabilities are measured under fourteen items derived from four sub-constructs: process innovation,

product innovation, and organisational innovation. Finally, via knowledge acquisition, dissemination, and the available knowledge's utilisation, KM means searching and assessing accessible knowledge required to achieve the organisation's goals (Chawla and Joshi 2010). For Darroch (2005), the independent variables (IVs) are measured by four sub-constructs: IT knowledge, IT operation, IT infrastructure, and IT management.

Information Technology Capabilities	**Reference**
IT Knowledge	
Overall, our technical support staff is knowledgeable when it comes to computer-based systems.	(Turulja and Bajgoric 2018), (Pérez-López and Alegre 2012), (Soto-Acosta, Popa, and Martinez-Conesa 2018), (Choi 2018).
Our firm possesses a high degree of computer-based technical expertise.	
We are very knowledgeable about new computer-based innovations.	
Our company is always keen to train the technical staff to keep abreast of all new technology.	
IT Operations	
We routinely utilise computer-based systems to access information from external databases.	(Turulja and Bajgoric 2018), (Pérez-López and Alegre 2012), (Adamides and Karacapilidis 2020)(Asim and Sorooshian 2019).
We use computer-based systems to analyse customer and market information.	
We utilise decision-support systems frequently when managing customer information.	
We have set procedures for collecting customer information from online sources.	
Items IT Infrastructure	
Our information systems are compatible.	(Chen et al. 2017; Pérez-López and Alegre 2012; Turulja and Bajgoric 2018).
Our information systems are Rapidity.	

Our information systems are connectivity.	
Our information systems are modular.	
Our information systems are scalable.	
Items IT Management	
Our firm efficiency is based on IT planning.	(Chen et al., 2015),(Bharadwaj, 1999),(Zhang, Sarker, & Sarker, 2008),(Akter et al. 2016).
Our IT understand our business and firm.	(Chen et al., 2015),(Zhang, Sarker, & Sarker, 2008)(Wang et al. 2015), (Wamba et al. 2017).
IT management in my firm is good at planning and understanding various business functions and business environments.	(Akter et al. 2016), (G Kim, B Shin, KK Kim 2011), (Wamba et al. 2017).
Our firm has good system development practices	(Chen et al., 2015), (Wang et al. 2015),(Kim, Shin, and Kwon 2013).
Our IT function is clear about its performance criteria and policies throughout the enterprise	(Wang et al. 2015), (Chen et al., 2015).
Our firm has good IT resources to deliver business value	(Chen et al., 2015), (Wang et al. 2015).
Innovation Capabilities	**Reference**
Product Innovation	
My organisation can develop original products.	(OECD 2005), (Laforet 2011), (Piening and Salge 2015); (La Rocca et al. 2016), (Deloitte 2017; Rajapathirana and Hui 2018).
My organisation can increase the value of the products.	
My organisation improve product innovation by adding new elements to the products.	
My organisation can improve technical product specifications.	
Process Innovation	

My organisation improve its process by increasing the speed of implementation.	(OECD 2005), (Deloitte 2017; Rajapathirana and Hui 2018).
My organisation can build theflat operating form.	
My organisation used a new interactive online process.	
My organisation used new methods to allow work instruction.	
My organisation improve cost efficiency by reducing variable cost.	
Organisation Innovation	
My organisation apply new business practice that improves management effectiveness.	(Deloitte 2017; Rajapathirana and Hui 2018), (Hamel 2006),(Gunday et al., 2011).
My organisation apply a new knowledge management system.	
My organisation improve its management through distributing responsibilities and decision making.	
My organisation improve the new external relationship.	
My organisation used to renew the organisational structure.	
Market Innovation	
My organisation access to the new market place.	(Deloitte 2017; Rajapathirana and Hui 2018).
My organisation use new media or technique.	
My organisation use new sales channels or placement.	
Knowledge Management	**Reference**
knowledge acquisition	
My organisation has a process to gain	(Ben Zaied, Louati, and Affes 2015),

knowledge of our supplier's customers and partners.	(Pérez-López and Alegre 2012), (Amalia and Nugroho 2011), (Xu et al. 2010), (Mafabi, Munene, and Ntayi 2012), (Honarpour et al. 2018), (Valmohammadi et al. 2019).
My organisation can generate new knowledge from existing knowledge.	
My organisation has a process in place to distribute knowledge throughout the organisation.	
My organisation holds periodic meetings to inform employees about the latest innovation.	
My organisation has a formal process to share the best practice among the different fields of activities.	
My organisation has processes for using knowledge to develop new products or services.	
My organisation has processes for using the knowledge that is accessible to those who need it.	
Knowledge dissemination	
My organisation has processes for distributing knowledge throughout the organisation.	(Ben Zaied et al. 2015), (Pérez-López and Alegre 2012), (Amalia and Nugroho 2011), (Xu et al. 2010)(Mafabi et al. 2012), (Honarpour et al. 2018), (Valmohammadi et al. 2019).
My organisation has processes for distributing knowledge among our business partners.	
My organisation designs processes to facilitate knowledge sharing across functional boundaries.	
Knowledge application	
My organisation has processes for integrating different sources and types of knowledge.	(Ben Zaied et al. 2015), (Pérez-López and Alegre 2012), (Amalia and Nugroho 2011), (Xu et al. 2010)(Mafabi et al. 2012), (Honarpour et al.

My organisation has processes for transferring organisational knowledge to employees.	2018), (Valmohammadi et al. 2019).
My organisation has processes for filtering knowledge.	
My organisation has processes for applying experiential knowledge.	
My organisation has processes for applying knowledge to solve new problems.	

The unit of analysis in this research is small-medium enterprises (SMEs) manufacturing in the United Arab Emirates (UAE). The focus of this research was narrowed down to manufacturing firms of medium size because they are well established and have good experience in using technology. This helps to address research gaps through answering the survey questions. In addition, they are the main contributors to the country's economy, both in gross domestic product (GDP) and job creation. The manufacturing sector in the UAE comprises large and medium-sized enterprises with a total number of 6,300 manufacturing firms, according to the Ministry of Economy Report 2019 (Budhwar et al. 2019). Of them, 3623 are medium manufacturing firms. SMEs in the UAE are defined as firms with fewer than 50 full-time employees and an annual turnover of less than AED 2 million.

Moreover, firms having a yearly turnover of between AED 2 and 200 million and 50 to 200 full-time employees are classified as medium-sized firms (Silver, J. Reeves, 2016; AlSharji et al., 2018). We obtained the list of the companies from the authority of investment in the Ministry of Economy. Through systemic random sampling, a survey was distributed to 330 medium-sized manufacturing companies in Abu Dhabi in June 2020, and 227 surveys were received entirely with about 69 percent. The targeted respondents were the executive managers because they are aware of their firms' dynamic capabilities and resources.

4. Results

Many academics are interested in how dynamic capability approaches the following question: why are certain firms more successful than others? The Resource-Based View (RBV) is a popular hypothesis on this subject (JB Barney 2007; Lockett, Thompson, and Morgenstern 2009). Relying on this concept, a firm's performance is determined by the resources it possesses and employs in its operations. Due to changes in the business environment resulting from various developing trends, such as those in the globalisation of business and information technology, current research has reported the distinction between tangible assets, for instance, physical capital, and intangible assets like organisational capabilities and routines. Only businesses that can successfully reposition and organise external and internal resources and capabilities to adapt to changes in the business environment might thrive in the world market (Helfat and Peteraf, 2003; Teece et al., 1997). They began with a resource-based approach in a dynamic environment. They suggested that a firm's success was signified by its potential to replenish its capacity to thrive in the dynamic business environment (Zhang and Lado 2001).

Dynamic capabilities are described as a company's capability to build, restructure, and integrate external and internal skills and resources to respond to fast-changing circumstances (Tanriverdi 2017; Wang, Klein, and Jiang 2007). In the digital era, information technology (IT) is the driving force that reshapes all businesses' aspects (Laudante 2017). In the current dynamic, global, and sophisticated business world, both human resources and knowledge are increasingly recognised as important drivers of competitive advantage (Prajogo and Oke 2016). IT (Rachinger et al. 2019), human resources (van Laar et al. 2017), and knowledge (Ibarra, Ganzarain, and Igartua 2018) are the most critical resources for businesses in the digital era. Many types of research have revealed the dynamic character of specific resources (Chang and Lin 2015; Zhao, Lu, and Wang 2013).

IT has become the key driver for developing firms and consolidating their position in the arena of globalisation. Yet, the volubility of IT is dependent on its capabilities, notably those that ease the enhancement of firms' activities and innovativeness. An organisation's use of an RBV ensures that resources deemed valuable and exceptional are acquired and appropriated by the controlling (or owning) business to give it a momentary competitive benefit (Wade and Hulland 2004). In this way, the literature says that IT competency or ability is valuable, can't be copied, and can't be traded for something else (Duncan 1995).

These assets, in turn, create a competitive advantage (Drnevich and Croson 2013; Gardner, Boyer, and Ward 2017; Wade and Hulland 2004). Competency in IT is understood as the capability of an organisation to mobilise and use IT-based resources through the management of information generated by the organisation. Knowledge management and transfer at different levels can also be defined according to IT competency. PerezArostegui, BenitezAmado, and TamayoTorres (2012), for example, defined IT competence as the degree to which a business has IT skills and uses them well to handle the data they create. Perez Arostegui et al. (2012) highlight that IT competency is defined by operations in IT, IT infrastructure (IT objects), and knowledge management in IT. These make resources co-specialised and mirror the firm's capacity to comprehend and utilise IT resources to govern the information collected from their customers and the market.

IT and Innovation

There has been an increasing interest in the value and relevance of information technology (IT) firms during the last decade. The majority of researchers were unable to prove that IT had a direct influence on a company's performance. This discrepancy stems from the authors' reluctance to see diverse organisational capacities as crucial intermediaries between performance and IT (Pérez-López and Alegre, 2012). Most IT studies discussed variables that impact IT adoption (Bayo-Moriones and Lera-López 2007), with the factors classified into three classifications: factors associated with the firm's characteristics; the firm's IT-using staff; and the firm's business environment (Ollo-López and Aramenda-Muneta 2012). There was a significant link between these variables, and there was a positive relationship between firm performance and innovation (Leitner et al., 2016; Birkner and Mahr, 2016). The findings of available research on the constructs of innovation capability (INC) and information technology capability (ITC) were, however, inconsistent (Turulja and Bajgoric 2016).The goal of this study is to see how IT skills affect a company's ability to come up with new ideas when judging its performance.

The important features of new types of innovation, for instance, the use of IT, greater involvement, their concerns for innovation policy, and the increasing pace of invention, were explored by Leitner et al. (2016). Innovation visions have been developed and reviewed by diverse specialists across Europe, relying on a collection of worldwide practise examples from society and industry. User innovation, open innovation, and crowdsourcing are examples of

modern innovation methods that have gotten a lot of attention in industry, academic, and policy circles. The advocates of these models frequently emphasise the importance of using these techniques to improve competitiveness in the global innovation race rather than addressing social issues.

IT software will be required for innovation, and we may expect more innovation automation in the future. The INFU project focuses on the concepts of "automated innovation" and "open-source society," both of which are heavily reliant on information and communication technology (ICT).The use of ICT to search for alternatives and the identification of consumer demands on the web for web-based product simulations and testing is projected to increase. Automatised innovation, such as semantic web analysis, may help develop approaches that automate elements of the innovation process, from idea creation through design and testing. In this method, smart semantic web filters track changes in consumer tastes and new ideas in real time and automatically find inventions that have a lot of market potential.

In terms of using ICT to conduct the innovation process, previous principles guided the utilisation of digital data for innovation reasons after collecting relevant data. This may lead to regulations and standards that would prevent innovation through automation. But in today's economy, Kmieciak, Michna, and Meczynska (2012) say that a firm's ability to innovate is one of the most important factors for its survival, competitiveness, and growth.Furthermore, being innovative is the only way to remain competitive in the long run (Kmieciak et al., 2012). Kmieciak et al. (2012) established two business goals. The first concern was how to boost and maintain innovation. The second topic was the relationship between invention and firm performance, both financial and non-financial.

Enhancing firm performance and gaining a competitive advantage are the two major motives for innovation. Depending on these scholars, empirical research is separated from the favourable relationship between innovation and firm performance (FP). Improved communication, information and knowledge sharing, organisational learning processes, and inter-organisational exchange, as well as the concepts that support an invention, may all be favourably influenced by IT (Kmieciak et al., 2012). Customer feedback may be sought via IT, along with data that can be used as insight into the innovation phase, providing better new services or products (Kmieciak et al., 2012). Upfront investments in intangible and tangible assets are required for innovation, and these investments' returns may take time to materialise (Kmieciak et al., 2012). Therefore, it is critical to establish an environment that encourages innovation on a long-term basis. Thus, we hypothesise that.

IT capabilities have a significant positive relationship with SMEs innovation capabilities

IT and knowledge

For years, one of the top priorities of managers and academics has been the development of knowledge management and information technology (IT) in order to gain a competitive lead. The rise of IT-enabled knowledge management capability (KMC) as a fundamental competence for organisations to improve innovation, human performance, competitive advantage, and organisational capabilities in today's drastically changing environment (Joshi et al., 2010; Tseng, 2014). KMC can be defined as the process-based capability of the organisation to mobilise and dispose of knowledge-based resources to achieve a competitive advantage. KMC is described as an organisation's process-based ability to organise and deploy knowledge-based resources to obtain a competitive lead. For instance, Siemens, the engineering company and German electronics manufacturer, has made substantial investments in its share of net knowledge management systems to enhance its business operations and generate customer value in an attempt to transition towards a knowledge-based organisation (Nielsen and Ciabuschi 2003).

The widespread and widespread use of information technology, particularly the internet and communication networks, has provided a secure, quick, and simple means of sharing, accessing, and storing data (Mohamed, Stankosky, and Murray, 2006).As a result, IT enables knowledge management to achieve a competitive advantage. As per the 2015 Knowledge Management Priorities Report, 93% of organisations have dedicated budgets for knowledge management, and 61% are optimistic about the future of knowledge management initiatives (APQC 2015).

The report also states that the methods through which technology investment promotes knowledge management are less visible and that the relationship between IT and knowledge management requires additional investigation. Nevertheless, based on prior research, three shortcomings can be identified. First, the connections between various IT resources and KMC were ambiguous in previous studies and needed to be investigated further. The resource-based view (RBV) views IT as a rare, important, and versatile organisational resource that allows for a broad and deep flow of knowledge to achieve high KMC (Bharadwaj 2000; Alavi and Leidner 2001; Wade and Hulland, 2004). On the other hand, the outcomes demonstrate the link between IT and knowledge management. Second, a number of academics have said that IT applications, especially the knowledge management system (Alavi and Leidner, 2001), can improve KMC (Joshi et al., 2010).Third, as IT gets better (Iyengar, Sweeney, and Montealegre, 2015), many organisations spend more on the technological part of knowledge management and related processes.

However, other scholars suggest that the utilisation of IT is unrelated to the effectiveness of knowledge management programmes (Mohamed et al., 2006) and that IT should only be utilised when essential. Furthermore, many sorts of IT resources that benefit KMC are unknown. IT is frequently seen as a specific dimension, like IT usage (Iyengar et al., 2015) or a second-order variable (Pérez-López and Alegre, 2012). In contrast, diverse forms of IT capacity have different characteristics that might lead to different effects and outcomes (Wade and Hulland, 2004). For example, it's important that the infrastructure of an information system (IS) is easy to copy and has the right level of ability.

However, in information technology-business collaboration, the characteristics are low and low-medium (Wade and Hulland 2004). As a result, IS-business partnerships and IS infrastructure might create various degrees of KMC. This creates a research gap that must be addressed. Second, previous research hasn't looked into how IT resources can have different effects on KMC in different situations or done an integrated study of the social–managerial and technical factors that affect knowledge management.

In earlier literature, two study lines on the effects of IT resources were provided. One study originated from a technological standpoint, stating that techniques, infrastructure, and systems assist knowledge management procedures (Tanriverdi 2005). Within an organisation, technical systems can influence how knowledge is gained, communicated, and preserved (Gold, Malhotra, and Segars 2001). Tanriverdi (2005) pointed out that in order to improve knowledge management, a thorough social-managerial and technical perspective should be supplied. (Chen et al., 2014) say that traditional RBV researchers say that there aren't enough resources for managing knowledge.

SME's knowledge management has a significant positive relationship with IT capabilities.

Knowledge Management and Innovation capability

Knowledge is described as a justified personal conviction that improves a person’s ability to behave effectively (Lopes et al., 2017). Knowledge management (KM) is derived from a number

of knowledge management activities, including retention, acquisition, application, and sharing (Akram et al., 2018). The process of constructing and managing information technology capabilities (ITC) is specified by knowledge management capabilities (KMCs) (Mugellesi Dow and Pallaschke 2010). According to IT and KM experts (Naqshbandi and Jasimuddin, 2018; Lee and Choi, 2003), KMCs play an important role in improving organisational performance.

KM is a domain and function that involves creating, sharing, codifying, acquiring, and applying knowledge in a conducive environment to improve organisational performance and innovation (Shujahat et al., 2019). KM has two key elements: the KM processes and the KM environment. The essential component is KM, which generates knowledge and persists even in the absence of official organisational support. Through knowledge discovery and new techniques, KM practises can yield the provision of skills and essential capacities to enhance organisations (value creation) (Farooq 2019). KM functions foster innovation capacities (Lawson, Samson, and Roden 2012) and functional outcomes (Kianto et al. 2014). Organizations that use KM practises like producing and sharing information lead to the expansion, innovation, and establishment of new business models and appropriate positions in their sector.

Organizations, society, the environment, and the economy may thrive from establishing and spreading knowledge networks (Lopes et al., 2017). An organisation develops an effective strategy to engage with the environment by generating knowledge-generating activities (Dayan, Heisig, and Matos 2017), which generates a sustained competitive lead (Skyrme and Amidon 2017). The depth of KM techniques is critical since it influences innovation activities and improves technical and general capacities in organisations (Clemons 2014). By promoting innovation procedures, KM enhances the practise of accessing knowledge, experience, new abilities, expertise, and customer value.

The outcomes of this method can help organisations enhance their understanding and experience, as well as their innovation (Scarbrough, Robertson, and Swan 2015). Based on Valmohammadi and Ahmadi's (2015) investigations, KM techniques are described in this study by four key components: knowledge acquisition, creation, sharing, and storage. In knowledge-based theory (KBT), Ben Zaied et al. (2015) and Damanpour et al. (2009) argue in knowledge-based theory (KBT) that knowledge resources are correlated to innovation and that these resources influence a firm's ability to innovate. As per Wilson (2007), innovation is the transformation of knowledge into new practices, products, processes, and services. So, the literature that was used as a source agrees that KM has an effect on how innovation is shared, acquired, and used.

Knowledge acquisition denotes the act of getting knowledge that is available someplace and the application of the existing knowledge or the discovery of new knowledge (Lin and Lee, 2005). The firm can gain information from within by incorporating explicit knowledge from intuitive knowledge or existing documents from people into its knowledge repositories. Apart from that, Yew Wong and Aspinwall (2004) suggest that firms achieve knowledge by hiring people with the necessary skills and buying knowledge assets like research documents and patents. Furthermore, having a close relationship with consumers may enable business managers to possess a direct and rapid flow of knowledge. This might facilitate their better collecting customer knowledge, competitors' activities and attitudes, market trends, and other establishments (Yew Wong and Aspinwall, 2004). Chen and Huang (2009) show that

employees' capacity grows when novel understanding is acquired within the firm, and they are able to transform the latest information and produce new ideas (Chen and Huang, 2009).

As a result, knowledge stocks grow, and businesses may benefit from new possibilities by implementing and utilising acquired information to generate innovative outcomes (Huang and Li 2009). The link between knowledge acquisition and innovation has been verified by academics. For example, Zhang et al. (2010) discovered that information obtained from alliance partners has an impact on organisations' knowledge production, which can result in innovations. CL Tan (2010) found a link between learning new things and technological innovation (product and process innovation) that is both positive and strong.

According to Mafabi et al. (2012), knowledge acquisition and organisational innovation are favourable and substantial. Knowledge sharing may be expressed as the cross-organisational exchange of experiences, knowledge, and skills (Lin, 2007). Members of the organisation communicate and exchange knowledge that might help them become more involved. This helps to foster the creation of innovative ideas (Huang and Li, 2009). As a result, a favourable relationship between information sharing and innovation may be anticipated. Finally, knowledge application (responsiveness to knowledge) is required in order to implement obtained information to create beneficial business decisions (Alavi and Tiwana, 2002). As a result, knowledge application can encourage innovative activities. According to findings from much research, innovation and KM have a good and substantial link. According to Xu et al. (2010), the way knowledge is administered can influence the success of business innovations. Amalia and Nugroho (2011) also said that a good KM process helps businesses come up with new ideas by storing, creating, applying, and spreading knowledge.

CL Tan (2010) and Allameh and Abbas (2010) identified a connection between product innovation and the efficacy of knowledge sharing, acquisition, and application. The above-mentioned connections in small and medium-sized enterprises (SMEs) were investigated using data from several empirical research studies. For instance, Alegre et al. (2013) discovered a favourable and substantial link between KM and innovation in high-tech SMEs. This statement was supported by a study by Price et al. (2013) that found the KM process supports innovation in SMEs. In the same way, Honarpour et al. (2018) found that knowledge management through knowledge acquisition, knowledge dissemination, and knowledge application has a positive effect on how Malaysian companies innovate their products and processes.

In addition, Valmohammadi et al. (2019) found that KM practises through four-function creation, acquisition, storage, and sharing are associated with innovation practises and firms' sustainability. Finally, Guzmán et al. (2012) discovered similar outcomes among Mexican SMEs. Apart from that, Nguyen et al. (2011) observed a deficiency of research on the use of KM in SMEs, particularly in developing nations. More study is needed to improve empirical research on the connections between KM and innovation in SMEs, as per Tee et al. (2012) and Hayder et al. (2019). Due to the scarcity of research on the topic, it is essential to examine the link between Rwandan SMEs and As a result, the following hypothesis is constructed:

H3: Knowledge management has a positive effect on innovation capability.

H4: Knowledge management mediates the relationship between IT capabilities and innovation capabilities.

5. Discussion

The purpose of this study is to find out which information technology capabilities (ITC) are linked to improved knowledge management (KM) and innovation capabilities in small and medium-sized businesses (SMEs). Because of their considerable contribution to the economy's gross domestic product (GDP) and employment generation, SMEs are seen as the economy's fortitude. However, this vital industry faces significant challenges, including fierce rivalry, short product life cycles, technological change, and shifting customer behaviour. According to the literature, ITC can revolutionise this sector and strengthen its competitive advantage by transferring knowledge and improving organisational communication, which improves knowledge management and innovation capacities, both of which are critical for a firm's long-term survival (Jahanshahi, Zhang, and Brem 2013; Perrini, Russo, and Tencati 2007; Schilir 2015)

IT capabilities are classified into four categories for this study based on past research: IT infrastructure, IT operations, IT management, and IT knowledge. ITC is critical in every organisation, and the agility and ability to support change are indicators of infrastructure quality (Al-Lamy et al., 2018; Tafti, Mithas, and Krishnan, 2013). The ability to deal with rapid changes and prevent increasing expenses by focusing on execution and adaptability (Mithas et al., 2012; Rehman et al. 2018) enhances revenue growth and rate of profitability. The IT infrastructure encourages business strategy innovation. System developers can plan and construct frameworks that meet formal goals and commercial investments thanks to infrastructure adaptability (Bahrini and Qaffas 2019; Boucharas et al. 2010).This framework allows the company to gain a competitive advantage by increasing revenue and asset returns (Chung, Rainer, and Lewis 2003; Nehemia-Maletzky, Iyamu, and Shaanika 2018; Xue et al. 2013) and decreasing product or cycle time on service delivery (Chung, Rainer, and Lewis 2003; Nehemia-Maletzky, Iyamu, and (Liu et al., 2013; Chen et al., 2017). IT has an impact on knowledge management, including knowledge dissemination, knowledge management, and knowledge application, according to this study. IT capabilities have also been found to affect product innovation. Meanwhile, knowledge management serves as a bridge between ITC and product development.

Acknowledgement

The authors would like to express their gratitude to the Centre for Technopreneurship Development (C-TED), the Centre for Research and Innovation Management (CRIM), and the Faculty of Technology Management and Technopreneurship at Universiti Teknikal Malaysia Melaka (UTeM) for supporting this publication.

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