Global Business and Management Research: An International Journal
Vol. 16, No. 4s (2024)

# Predictors of competitive advantage in information technology for SME entities: Knowledge management and innovation capabilities

**Talal Mohammed Al Teneiji**
*Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia*
Email: p061710009@student.utem.edu.my

**Amiruddin Ahamat***
*Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia*
Email: amiruddin@utem.edu.my

**Murzidah Ahmad Murad**
*Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia*
Email: murzidah@utem.edu.my

* *Corresponding Author*

**Abstract**
**Purpose:** The purpose of this study is to identify the IT capabilities linked to innovation capabilities through knowledge management and analysing their impact on innovation capabilities.
**Design/methodology/approach:** A structured survey questionnaire was designed to collect quantitative data, which was completed by 321 managers of SMEs in the service industry.
**Findings:** The results of this study showed that information technology competences, notably IT infrastructure, IT integration, and IT knowledge, have a significant effect in innovative capacities. The result also reveals that knowledge management, which mediates the link between IT competences and innovation capabilities, is favourably correlated with IT competencies.
**Research limitations/implications:** One potential limitation of the study is related to the generalizability of findings. The study may primarily involve SMEs from a specific geographic region or industry sector, which could limit the broader applicability of the results. Future research could consider expanding the scope of the study to include SMEs from diverse geographic locations and industry sectors.
**Practical implications:** This research may offer valuable insights into how SMEs can harness these predictors to gain a competitive edge in the IT sector. SMEs in the IT industry should consider incorporating effective knowledge management practices and fostering a culture of innovation within their organizations.
**Originality/value:** The research is original in its practical orientation. It goes beyond theoretical exploration by providing SMEs with actionable insights and strategies based on empirical findings. This orientation bridges the gap between academic research and real-world applications, making it valuable for both scholars and practitioners.

**Keywords**: IT capabilities, SME, competitive advantage, knowledge management, innovation capabilities

## Introduction

In today's globalised world, small and medium-sized firms (SMEs) are an essential part of national economic development. Researching SMEs (small and medium enterprises) in the UAE is essential for several reasons, supported by recent scholarly work and reports. Firstly, economic significance. SMEs represent a substantial portion of the UAE's economy, accounting for about 60% of the GDP and employing over 85% of the private sector workforce (Al Blooshi, Jose and Venkitachalam, 2024). This highlights their critical role in economic stability and growth. Understanding the dynamics of SMEs helps policymakers and stakeholders develop strategies to sustain and enhance their contribution to the economy.
However, SMEs often face a significant threat from overseas multinational businesses as well as new local market entrants. Thus, securing SME owners' and government policymakers' competitive advantages (CAs) becomes their main objective. The relationship between so-called innovation, knowledge management (KM), or IT abilities and the different indicators of SMEs' CAs is being supported by a growing body of research. However, there is no conclusive justification for this connection's existence. In the UAE, SMEs are defined as companies with fewer than 50 full-time employees and annual revenues of less than AED 2 million, while medium-sized companies have annual revenues of AED 2 to 200 million and between 50 and 200 full-time employees (Silver, J. Reeves, 2016; AlSharji et al., 2018). SMEs vary from large firms in numerous ways (Ramdani et al., 2013). SMEs, for instance, are subject to stricter regulation. They are less likely to recruit experts, nevertheless (James, 1999; Thong, 2015).
Other than that, SMEs should emphasise general skills more because they might not have the IT technical or expertise experience needed to effectively understand and harness its advantages (DeLone, 2006). Additionally, due to their limited financial resources, SMEs could be reluctant to invest in technical expertise or sizable IT infrastructure (McCann and Barlow, 2015). This is due to the fact that they are aware they won't always have the managerial and financial resources necessary to address any concerns (Baby and Joseph, 2016). This research will help in the development of deeper strategic insights about the cutting-edge technology used by SMEs in the UAE. The UAE is expected to significantly lessen its reliance on oil as its main source of income by 2025. Figure 1.1, for instance, illustrates how little the SME sector contributed to GDP in 2021—barely 11%.

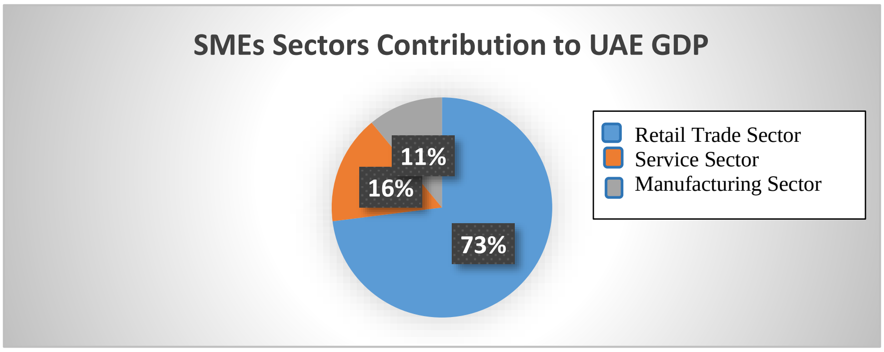


Figure 1:SMEs sectors GDP (National Bank of Fujairah, 2021)

The growth of SMEs is hampered by a number of issues. They are fundamentally uninnovative (Ng and Hamilton, 2021) because they are incapable of learning (Donbesuur, Zahoor, and Adomako, 2021). Many businesses in the UAE understand the value of education and learning in enhancing their capacity for innovation (Donbesuur et al., 2021). Due to their importance in the growth of learning capacity, which is essential for innovation, organisations have paid close attention to developing their IT capabilities (Alkatheeri, Jabeen, Mehmood, and Santoro, 2021). Therefore, the goal of this study is to close this gap by finding the IT skills connected to KM's innovative skills. The goal of this study is to ascertain if IT capabilities, as a component of open innovation, could benefit SMEs in a developing market like the UAE. Examples of internally driven factors that might support or impede a company's capacity for innovation include ITI, ITM, and alignment.

## Literature Review

### Information Technology Capability

The four dimensions are described in the following ways:

### IT Knowledge

Digital information, which is kept in KM systems, and human knowledge, which is stored by internal experts, are the two categories into which organisational knowledge is divided. Choi (2018) also discovered that the integration of human knowledge, digital knowledge, and IT resources significantly improves service competence and performance. The primary driver of the advancement of innovative capabilities in small and medium-sized enterprises (SMEs) is their IT proficiency. Soto-Acosta et al. (2018) conducted research that demonstrates the importance of IT competency in the development of innovative ambidexterity. In addition, the application of structural equation modelling (SEM) to 429 Spanish SMEs demonstrated IT capacities in terms of a high level of proficiency in the creation and maintenance of fresh IT connected to innovation development and knowledge of fresh ICT innovations. Interpersonal and personal skills, integrity, and honesty are the most critical skills and qualities for entry-level IT employees, as per Aasheim et al. (2012) and Stal and Paliwoda-Pkosz (2019). The integration of human, digital, and IT resources significantly enhances service competence and performance. Alshamaila et al. (2020) discovered that the utilisation of IT knowledge and resources in small and medium-sized enterprises (SMEs) results in enhanced business performance and innovation capabilities. Their research underscores the importance of information technology in promoting innovation and knowledge sharing. The development of innovative capabilities in small and medium-sized enterprises is contingent upon IT proficiency. In accordance with a study conducted by Dubey et al. (2021), IT competence enables SMEs to exploit existing capabilities and explore new opportunities, thereby enabling them to accomplish innovative ambidexterity. Their research underscores the fact that IT proficiency facilitates the adoption of new technologies and processes, thereby fostering innovation and a competitive edge. The significance of interpersonal and personal skills, integrity, and honesty for entry-level IT employees has been underscored by recent research. The research conducted by Chen et al. (2022) corroborates the conclusions of Aasheim et al. (2012) and Stal and Paliwoda-Pkosz (2019), indicating that technical skills alone are insufficient. Rather, success in the IT sector necessitates a blend of ethical, interpersonal, and technical abilities.

Table 1: Measurement IT Knowledge

| Items IT Knowledge | References |
|---|---|
| Our technical support personnel is generally informed with computer-based systems. | |

| | |
|---|---|
| Our company has a high level of computer-based technical skills. | (Pérez-López and Alegre, 2012;Turulja and Bajgoric, 2018; Soto-Acosta et al., 2018; Choi, 2018). |
| We are well-versed in modern computer-based advances. | |

IT Operations

According to Adamides and Karacapilidis (2020), IT operations are a group of tasks and services that an IT team offers to internal and external clients in order to run the company. The phrase refers to the application of operations management to a business technology need. So, resolving customer complaints or tickets raised for maintenance work is an example of an operations activity. Several operational teams rely on on-call responses during off-hours times. The personnel and management procedures involved in providing clients with a wide range of services at the proper level of quality and at reasonable costs are referred to as ITO in the Gartner Glossary.

Table 2: Measurement of IT Operations

| Items IT Operations | References |
|---|---|
| We frequently use computer-based solutions to obtain data from external databases. | (Pérez-López and Alegre, 2012); (Turulja and Bajgoric, 2018); (Asim and Sorooshian, 2019); (Adamides and Karacapilidis, 2020) |
| We examine customer and market data using computer-based technologies. | |
| When managing consumer information, we typically use decision-support tools. | |
| We have protocols in place for gathering client information from online sources. | |

IT Infrastructure

ITI refers to assets, instruments, and artefacts that support data processing, acquisition, distribution, archiving, and usage. This description classifies the ITI as including hardware, software, and support staff. Additionally, ITI flexibility is described by IT organic components including compatibility, connection, personality, and modularity (Liu et al., 2013). IT can support strategic flexibility, a problem that is still unresolved, by offering a strong telecommunications infrastructure, including several features, integrating IS applications, and regularly using database-oriented applications in day-to-day operations (Y. Chen et al., 2017). This study aggregates many research on ITI flexibility and shows how ITI affects a variety of business performance and innovation metrics.

Table 3: Related Studies on IT Infrastructure and its Relationship with Firms

| Author | Title | Journal Name | Q |
|---|---|---|---|
| Swafford, Ghosh, and Murthy (2008) | Supply chain agility can be achieved through IT integration and adaptability. | International Journal of Production Economics | Q1 |
| H. Chae et al. (2014) | Contradictory data and alternative explanations for information technology capability and firm performance | Mis Quarterly | Q1 |

| | | | |
|---|---|---|---|
| Shelly Ping-Ju Wu and Detmar W.Straub (2015) | The impact of information technology governance systems and strategic alignment on organisational performance: findings from a matched survey of business and IT executives | Mis Quarterly | Q1 |
| Chuang and Huang (2016) | The impact of environmental corporate social responsibility on environmental performance and business competitiveness: the role of green information technology capital in the process | Journal of Business Ethics | Q1 |
| Liu et al. (2016) | A resource orchestration viewpoint on the relationship between supply chain integration and information technology expertise. | Journal of Operations Management | Q1 |
| Ashrafi and Zare Ravasan (2018) | How market orientation leads to market success and innovation: the roles of business analytics and flexible IT infrastructure | Journal of Business and Industrial Marketing | Q1 |
| Garcia-Morales et al. (2018) | Social media technologies' impact on organisational effectiveness via knowledge and innovation | Baltic Journal of Management | Q2 |
| Ravichandran (2017) | Investigating the connections between IT competency, innovation capability, and organisational agility | The Journal of Strategic Information Systems | Q1 |
| Alkatheeri et al. (2021) | To evaluate the impact of information technology capabilities (ITC) on organisational performance (OP) in the hospitality business. | International Journal of Emerging Markets | Q2 |
| Al-Shami, Bakri, Adil, and Mamun (2021) | To conduct research on the various forms of IT competencies and their impact on innovation capacities in high-tech enterprises. | Foresight | Q2 |
| Popa, Soto-Acosta, and Palacios-Marqués (2021) | Investigate the impact of technological, organisational, and environmental factors on the amount of innovation in small and medium-sized firms (SMEs). | Journal of Knowledge Management | Q1 |
| Nugroho, Prijadi, and Kusumastuti (2022) | Investigate the effects of diverse entrepreneurial, technological, and marketing orientations on education service firm performance (FP) and the function of information technology (IT) adoption capability as a moderator. | Strategic orientations and firm performance | Q1 |

Furthermore, rather than being a precise collection of technological tasks, IT capacity is a comprehensive organisation efficiency in affecting information that sets them apart from their rivals (Chae et al., 2014). According to Byrd and Turner's (2000) definition, the degree of reusability and the sharing of IT architecture are used to assess the flexibility of IT. IT is founded on the concepts of the modular systems theory for the united notion of flexibility (Ray, Xue, and Barney, 2013). In addition, IT compatibility makes information, data, and expertise widely available inside the organisation and enables the company to cross organisational barriers (Liu et al., 2013). This would be on top of the company's coordinated effort with channel partners as they carry out complex activities (such on-demand forecasting, cooperative planning, and the creation of new products or services) that enable supply chain network optimisation (Liu et al., 2016).
The organisation may quickly transfer data between new IT applications and old platform systems thanks to this compatibility, which facilitates the switch to new systems (Liu et al., 2016; Saraf, Langdon, and Gosain, 2007). According to Ashrafi and Zare Ravasan (2018), flexible ITI is based on a firm's ITI's ability to handle various business applications. Information and communication technology enables the storing, structuring, encoding, and retrieving of knowledge using tools that offer the infrastructure and capabilities to support KM architecture (Bharati and Chaudhury, 2019). Similar to this, IT is essential to knowledge management (KM) since it affects accessibility, performance, and impact, which in turn affects innovation, excellence, and organisational sustainability (Rehm and Goel, 2017).

Table 4: Measurements of IT Infrastructure

| Items IT Infrastructure | References |
|---|---|
| Our company has a formal MIS department. | (Y. Chen et al., 2017; Pérez-López and Alegre, 2012; Turulja and Bajgoric, 2018) |
| Our firm employs a manager whose main duties include the management of our information technology. | |
| Our firm’s members are linked by a computer network. | |
| Our firm creates customized software applications when the need arises. | |

IT Management (ITM)
ITM improves organisational performance through project management and planning, claim Kamdjoug and Tewamba (2018). However, for successful ITM, several prediction criteria are needed. This comprises IT project management practises, effective IT planning, and planning for security control (Y. Chen et al., 2015), as well as consistent IT policies (M. Zhang et al., 2008).

**Hypothesis Development**

IT Capability and Innovation Capability
Over the past ten years, there has been an increase in interest in how beneficial and valuable IT is to businesses. The majority of academics, however, were unable to demonstrate how IT directly affects company performance. The discrepancy, according to Pérez-López and Alegre (2012), is caused by the authors' unwillingness to see other organisational capacities as key intermediaries between IT and performance. The majority of IT research has focused on the

variables that influence IT adoption (Bayo-Moriones and Lera-López, 2007), with the factors that were examined falling into three categories: variables related to the firm's IT-using staff, firm characteristics, and firm's business environment (Ollo-López and Aramenda-Muneta, 2012).
It was acknowledged that there was a positive link between company success and innovation since there was a strong association between these dimensions (Leitner et al., 2016; Birkner and Mahr, 2016). Additionally, the research that is currently available on ITC (IT Capability) and INC (innovation capability) offers a variety of results (Turulja and Bajgoric, 2016). Therefore, the purpose of this study was to ascertain how INC's perception of IT proficiency affected corporate performance. Leitner et al. (2016) investigated the key traits of new forms of innovation, including their use of IT, enhanced participation, and accelerating rate of invention, as well as their implications for innovation policy. Diverse European experts have created and examined innovation visions using international practising examples gathered from society, including industry. In academia, politics, and commercial circles, open innovation, crowdsourcing, and user innovation are examples of contemporary innovation methodologies that have received a lot of attention.
Instead of addressing social issues, these model proponents usually underline how crucial it is to use these strategies to increase competitiveness in the global innovation race. Therefore, IT software will be essential for innovation, and it is anticipated that there will be an increase in the automation of innovation in the next years. However, innovation requires upfront expenditures in both tangible and intangible assets, and the benefits of these investments could take some time to manifest (Kmieciak et al., 2012). Creating a climate that supports long-term innovation is therefore crucial.

H1: IT capabilities have a significant positive relationship with innovation capabilities.
H1a: IT Infrastructure has a significant positive relationship with innovation capabilities.
H1b: IT Operations have a significant positive relationship with innovation capabilities.
H1c: IT Knowledge has a significant positive relationship with innovation capabilities.
H1d: IT Management has a significant positive relationship with innovation capabilities.

IT Capabilities and Knowledge Management
Knowledge management (KM), according to Bhatti and Qureshi (2007), is the study of explicit and tacit knowledge possessed by individuals, organisations, and groups with the aim of translating these treasures into organisational assets that managers can utilise to inform decision-making. For a long time, managers and academics have prioritised the growth of KM and IT in order to obtain a CA. The development of IT-enabled KM capacity (KMC) as a fundamental capability for organisations to boost human performance, innovation, and organisational skills, as well as a CA, is becoming more and more important in today's rapidly changing environment (Joshi et al., 2010; Tseng, 2014). 61% of businesses are optimistic about the future of KM initiatives, and 93% of companies have funds set aside particularly for KM, according to the 2015 Knowledge Management Priorities Report (APQC, 2015). The paper claims that as it is less evident how technology investment promotes KM, additional study into the relationship between KM and IT is required. However, three research holes might be identified based on past studies. First, prior research raised concerns regarding the relationship between KMC and other IT resource categories, necessitating more study.
Some scholars claim that the use of IT technologies, notably the KM system, may increase KMC inside an organisation (Alavi and Leidner, 2001; Joshi et al., 2010). As a result, a lot of companies are increasing the amount of money they spend on the technological components of knowledge management and related processes. Other academics, on the other hand, believe

that the use of technology should only be used when absolutely essential and that it has nothing to do with the success of KM projects (Mohamed et al., 2006). Additionally, it is yet unknown which IT resources may be leveraged to improve KMC.

H2: IT capability has a significant positive relationship with knowledge management capabilities.
H2a: IT Infrastructure has a significant positive relationship with knowledge management capabilities.
H2b: IT Knowledge has a significant positive relationship with knowledge management capabilities.
H2c: IT Operation has a significant relationship with knowledge management capabilities.
H2d: IT Management has a significant positive relationship with knowledge management capabilities.

Knowledge Management and Innovation Capability

Innovative skills may help businesses stand out from the market and aid in the acquisition of CA. Apple, Amazon, and Samsung are illustrative instances of this kind of business. Aside from the CA, an organization's goods have a higher economic worth when they are creative and sustainable, drawing in more consumers (Gaziulusoy, Boyle, and McDowall, 2013). Therefore, innovation encourages firms to find or realise what others have not, which becomes a reason for CA for long-term enterprises. Adoption of organisational KM allows companies to provide services and goods that are more innovative and competitive. In addition, as part of the race to adopt new technology, the majority of organisations want to purchase contemporary technologies. Only a small number, nevertheless, are using technology to efficiently extract and manage their knowledge resources. IT may aid companies in enhancing performance and achieving SCA. In addition to achieving SCA, they also reduce costs for business models that can increase revenue, simplify numerous processes, and spur innovation (Mao, Liu, Zhang, and Deng, 2016).

Although some academics believe that investing in IT will increase a company's expenditure expenses and harm its SCA in the market, others disagree (Neirotti and Raguseo, 2017). Because IT has grown uniform and worldwide, it has become rather simple to duplicate the ITC of other organisations (H. C. Chae, Koh, and Prybutok, 2014). At the operational level, the importance of KM in process improvement has been acknowledged (Choo et al., 2007; Andersson et al., 2020). Knowledge is ingrained in the business process, and using knowledge is seen as an integral part of organisational members' day-to-day job, claim Han and Park (2009) and Hu et al. (2019). Ghiorghita (2017) said that employing KM techniques successfully ensures businesses of ongoing process improvement. Process improvement needs KM assistance since KM systems, tools, and technologies make it possible for knowledge to be stored, documented, and shared for the benefit of organisations (Becerra-Fernandez, 2010; Ratwiyanti et al., 2020). Business process improvement requires the use of KM techniques, according to Massingham and Al Holaibi (2017). Workflow efficiency may be improved and waste points in corporate processes may be removed by incorporating KM.

To provide better guidance in KM practises, researchers have developed a number of frameworks and models on knowledge generation, conversion, and consumption (Heisig, 2009; Girard and McIntyre, 2010; Hu et al., 2019), which are among the best and most important models in the field (Choo and Bontis, 2002; Roos, 2017). For instance, based on Polanyi's (1966) definition, Nonaka (1994b) and Koehler et al. (2019) distinguish between tacit knowledge (knowledge buried in actions and circumstances) and explicit knowledge (information that can be expressed in words and readily communicated). Knowledge

management practises (KMP) may provide skills that supply and demand capabilities to develop enterprises (value creation) through knowledge discovery and creative techniques (Farooq, 2019). Innovation and practical results are fostered by KM activities (Lawson, Samson, and Roden, 2012; Kianto, Ritala, Spender, and Vanhala, 2014). As a result, businesses that use KM techniques, such innovation, development, and knowledge sharing, thrive, create new business models, and establish themselves as legitimate players in their industry.
The relationship between gathering knowledge and invention has been confirmed by academics. For instance, Zhang et al. (2010) found that knowledge growth within companies, which may lead to innovations, is influenced by information gained from alliance partners. CL Tan (2010) identified a strong and advantageous (process and product) connection between knowledge accumulation and technological innovation. Knowledge gain and OI have a positive and substantial connection, claim Mafabi et al. (2012). According to Lin (2007), knowledge sharing is the cross-organizational interchange of knowledge, skills, and experiences. Nguyen et al. (2011) note that there is little study on KM implementation in SMEs, particularly in developing countries. More research is required, according to Tee et al. (2012), to increase empirical studies on the relationships between innovation and KM in SMEs. The connection between Rwandan SMEs needs to be investigated because there is a dearth of study on the issue. In light of this, the following theory is put forth:

H3: Knowledge management (KM) has a positive effect on innovation capability.
H4: Knowledge management (KM) mediates the relationship between IT capabilities and innovation capability.

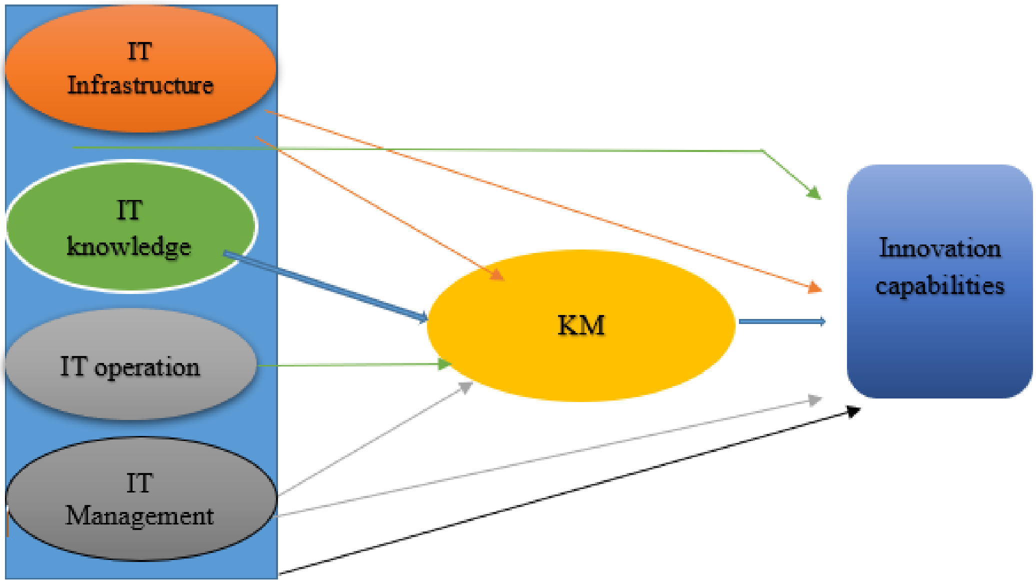


Figure 2: KM Model

**Methods**

The population of this research comprises of SMEs in the UAE. According to Purcell et al.'s definition from 2007, a population is made up of people or things that share certain traits with the target audience as a whole. Selecting a study population is the process of choosing a group of individuals from a sample who meet specific criteria and reflect the characteristics of the target community (Burns and Groves, 1997; Uma and Roger, 2003).The managers of SMEs in the UAE are the main subject of the current study. The chosen managers were given the

questionnaire. The management of SMEs' resources and innovative growth must engage the managers. In addition, they need to have more than a year of work experience. SMEs are chosen since they are the main forces behind the growth of the UAE economy. According to the National Bank of Fujairah (2019), there were around 400,000 SMEs in the UAE as of August 2019. They provide more than 60% of the non-oil GDP of the UAE and 86% of the private labour force. Notably, they account for 16% of the services sector, 73% of the wholesale and retail trade sector, and 11% of the industrial sector. As a result, the service sector is the focus of this study (Babu Das, 2019).
This table displays the number of responders who will be included in the sample. As a result, the sample is representative of the whole population being studied. They also discuss the connection between sample size and population size. When the population increases, the sample size will increase accordingly, and vice versa. The sample size and selection method, aside from that, are acceptable for attaining the research goal. The following table and formula are provided:

$$S = \frac{X2NP(1-P)}{d2(N-1)+X2P(1-P)},$$

where
S = the acquired sample size
X2 = the table value of X^2 for 1 degree of freedom at the intended confidence level
N = the population size
P = the population proportion (assumed to be 0.50 to create the maximum sample size)
D = the degree of accuracy presented as a proportion (5% is the value set in this study) (Confidence level 95%: margin of error %0.05).

**Findings**
SmartPls hypothesis testing will be used to assess these inquiries. Utilising Smartpls, the third inquiry will assess the contribution of knowledge management to the link between IT and innovative capabilities. The fourth and final inquiry will use structural equation modelling to assess the whole model of influential elements that affect innovative capabilities.

Table 5: Tool of Analysis

| Questions | Hypotheses | Tool of Analysis |
|---|---|---|
| RQ1. How do information technology (IT) capabilities influence small and medium-sized enterprises (SMEs) innovation capabilities? | H1a: IT Infrastructure has a significant positive relationship with innovation capabilities. | SmartPLS/ Hypotheses Testing |
| | H1b: IT Operations have a significant positive relationship with innovation capabilities. | |
| | H1c: IT Knowledge has a significant positive relationship with innovation capabilities. | |
| | H1d: IT Management has a significant positive relationship with innovation capabilities. | |

| | | |
|---|---|---|
| RQ2. What is the role of IT capabilities in knowledge management (KM)? | H2a: IT Infrastructure has a significant positive relationship with knowledge management capabilities. | SmartPLS/ Hypotheses Testing |
| | H2b: IT Knowledge has a significant positive relationship with knowledge management capabilities. | |
| | H2c: IT Operation has a significant relationship with knowledge management capabilities. | |
| | H2d: IT Management has a significant positive relationship with knowledge management capabilities. | |
| RQ3. Does the knowledge management (KM) process mediate the relationship between IT capabilities and small and medium-sized enterprises (SMEs) innovation capabilities? | H3: Knowledge management (KM) has a positive effect on innovation capability.<br>H4: Knowledge management (KM) mediates the relationship between IT capabilities and innovation capability. | SmartPLS/ Hypotheses Testing |
| RQ4. What are the critical factors that influence small and medium-sized enterprises (SMEs) competitive advantage (CA)? | Develop Model | Structure Equation Model |

Data Screening

Nevertheless, 389 SME businesses acting as the study's unit received questionnaires, with the owner-manager or manager as the intended respondent. The study's response rate of 69% complies with Joseph F. Hair, Anderson, Babin, and Black's (2010) recommendation that a survey's minimum response rate be 50%. The normal distribution of the data is another important factor that must be taken into account in order for the data to be suitable for analysis. According to Hair et al. (2013), the normal data distribution is based on the notion that the data distribution has a bell shape. Examining the data distribution is essential even if partial least squares structural equation modelling (PLS-SEM) does not assume that the data is normally distributed (Hair et al., 2013). In addition, the researcher may assess the data's normalisation by determining the distribution's kurtosis and skewness. Kurtosis and skewness are terms used to describe how far to the right or left a variable's distribution is along the X-axis and the Y-axis, respectively (Hair et al., 2013). When both the kurtosis and skewness values are 0, the data is considered to have a normal distribution. According to Joseph F. Hair Jr. et al. (2013), this is unusual. The guiding principle for normal distribution is, then, to accept items with absolute kurtosis values less than 7 and skewness values less than 2.

Demographic information about the respondents, including firm name, location, and email addresses, is included. We found that 71.3% of the businesses were in the private sector and 28.7% were in the public sector. The second measure used to demonstrate discriminant validity is cross-loadings, which are generated by an algorithm included in the Smart PLS programme. These results demonstrated that, when compared to the other constructions, each measurement item value is higher for its corresponding construct. Additionally, it demonstrated how each construct's block of values differed from the others by having values that were higher than those of the other blocks in the same columns and rows. The cross-loading measure therefore validated the discriminant validity of this investigation. The data analysis tests showed that the measurement model used in this research is real and can be used to assess the parameters of the structural model, illuminating the reliability and validity measurements.

Table 6: Assessment model's summary

| Construct | Items | Factor Loading | CA | CR | AVE | Discriminant Validity |
|---|---|---|---|---|---|---|
| Innovation Capabilities (IC) | ICIC1 | 0.815 | 0.969 | 0.972 | 0.673 | YES |
| | ICIC2 | 0.745 | | | | |
| | ICIC3 | 0.815 | | | | |
| | ICIC4 | 0.816 | | | | |
| | ICIC5 | 0.813 | | | | |
| | ICID1 | 0.812 | | | | |
| | ICID2 | 0.882 | | | | |
| | ICID3 | 0.866 | | | | |
| | ICID4 | 0.848 | | | | |
| | ICMI1 | 0.772 | | | | |
| | ICMI2 | 0.763 | | | | |
| | ICMI3 | 0.755 | | | | |
| | ICOI1 | 0.861 | | | | |
| | ICOI2 | 0.896 | | | | |
| | ICOI3 | 0.849 | | | | |
| | ICOI4 | 0.801 | | | | |
| | ICOI5 | 0.820 | | | | |
| Innovation Capabilities - Marketing Innovation (ICMI) | ICMI1 | 0.938 | 0.864 | 0.917 | 0.788 | YES |
| | ICMI2 | 0.859 | | | | |
| | ICMI3 | 0.864 | | | | |
| Innovation Capabilities - Organizational Innovation (ICOI) | ICOI1 | 0.890 | 0.916 | 0.937 | 0.749 | YES |
| | ICOI2 | 0.911 | | | | |
| | ICOI3 | 0.855 | | | | |
| | ICOI4 | 0.824 | | | | |
| | ICOI5 | 0.846 | | | | |
| Innovation Capabilities - Innovation Process (ICIC) | ICIC1 | 0.894 | 0.913 | 0.936 | 0.745 | YES |
| | ICIC2 | 0.771 | | | | |
| | ICIC3 | 0.871 | | | | |
| | ICIC4 | 0.874 | | | | |
| | ICIC5 | 0.899 | | | | |
| Innovation Capabilities - Innovation Product (ICID) | ICID1 | 0.833 | 0.919 | 0.943 | 0.805 | YES |
| | ICID2 | 0.927 | | | | |
| | ICID3 | 0.911 | | | | |
| | ICID4 | 0.915 | | | | |
| Information Technology Capability (IT Infrastructure) (ITI) | ITI2 | 0.797 | 0.739 | 0.836 | 0.562 | YES |
| | ITI3 | 0.701 | | | | |
| | ITI4 | 0.772 | | | | |
| | ITI5 | 0.724 | | | | |
| Information Technology Capability (IT Knowledge) (ITK) | ITK1 | 0.826 | 0.867 | 0.909 | 0.715 | YES |
| | ITK2 | 0.868 | | | | |
| | ITK3 | 0.769 | | | | |
| | ITK4 | 0.912 | | | | |
| Information Technology | ITM1 | 0.818 | 0.898 | 0.924 | 0.709 | YES |
| | ITM2 | 0.817 | | | | |
| | ITM3 | 0.875 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Capability (IT Management) (ITM) | **ITM4** | **0.878** | | | | |
| | **ITM5** | **0.821** | | | | |
| Information Technology Capability (IT operations) (ITO) | **ITO1** | **0.848** | **0.875** | **0.915** | **0.728** | **YES** |
| | **ITO2** | **0.871** | | | | |
| | **ITO3** | **0.832** | | | | |
| | **ITO4** | **0.861** | | | | |
| Knowledge Management - Knowledge Acquisition (KMAC) | **KMAC1** | **0.735** | **0.879** | **0.909** | **0.624** | **YES** |
| | **KMAC2** | **0.842** | | | | |
| | **KMAC3** | **0.775** | | | | |
| | **KMAC4** | **0.802** | | | | |
| | **KMAC5** | **0.796** | | | | |
| | **KMAC7** | **0.787** | | | | |
| Knowledge Management (KM) | **KMAC1** | **0.708** | **0.942** | **0.949** | **0.572** | **YES** |
| | **KMAC2** | **0.824** | | | | |
| | **KMAC3** | **0.735** | | | | |
| | **KMAC4** | **0.746** | | | | |
| | **KMAC5** | **0.734** | | | | |
| | **KMAC7** | **0.736** | | | | |
| | **KMAP1** | **0.763** | | | | |
| | **KMAP2** | **0.737** | | | | |
| | **KMAP3** | **0.785** | | | | |
| | **KMAP4** | **0.782** | | | | |
| | **KMAP5** | **0.746** | | | | |
| | **KMDI1** | **0.759** | | | | |
| | **KMDI2** | **0.764** | | | | |
| | **KMDI3** | **0.768** | | | | |
| Knowledge Management - Knowledge Application (KMAP) | **KMAP1** | **0.863** | **0.907** | **0.931** | **0.729** | **YES** |
| | **KMAP2** | **0.815** | | | | |
| | **KMAP3** | **0.877** | | | | |
| | **KMAP4** | **0.877** | | | | |
| | **KMAP5** | **0.835** | | | | |
| Knowledge Management - Knowledge Dissemination (KMDI) | **KMDI1** | **0.896** | **0.836** | **0.901** | **0.753** | **YES** |
| | **KMDI2** | **0.857** | | | | |
| | **KMDI3** | **0.850** | | | | |

Path Coefficients

"Bootstrapping" is a method used in SmartPLS to get data for analysing the linkages (paths) between independent and dependent variables. To be certain that all of the pathways linking these variables are significant, the p-values and T-statistics are also computed. In addition, the coefficient is considered significant at a certain level of confidence when the statistical t-value obtained from experimentation is more than the critical value, according to F. Hair Jr. et al. (2014). In this investigation, a t-value of 0.95 was used at a significance level of 0.05. According to F. Hair Jr. et al. (2014), PLS-SEM uses the nonparametric statistical method known as "bootstrapping" to measure the significance of the projected route coefficient. The coefficient values range from -1 to +1, they added. As a result, route coefficients close to +1 suggested a strong correlation, whereas coefficients close to -1 indicated a weak relationship. The experimentally obtained p-values, t-values, and path coefficients between variables in the current study are shown in Table 4.23. It should be noted that route assessments were used to decide whether a hypothesis should be accepted or rejected. Based on the results of the current inquiry, all hypotheses were validated at a significance level of 0.05. To provide the report on confidence intervals and effect sizes based on the given path coefficients table, the study follow these steps:

Calculate the Confidence Intervals (CIs):
The 95% confidence interval can be calculated using the formula: CI=Path Coefficients ±1.96 X Standard Deviation

Calculate the Effect Sizes:
The effect size can be interpreted using the standardized path coefficient itself, with the understanding that larger absolute values indicate stronger effects.

Report on Confidence Intervals and Effect Sizes

1. ITI -> IC:
- Confidence Interval: [0.007, 0.325]
- Effect Size: 0.166 (small to moderate effect)

2. ITI -> KM:
- Confidence Interval: [0.010, 0.320]
- Effect Size: 0.165 (small to moderate effect)

3. ITK -> IC:
- Confidence Interval: [0.011, 0.333]
- Effect Size: 0.172 (small to moderate effect)

4. ITK -> KM:
- Confidence Interval: [0.033, 0.343]
- Effect Size: 0.188 (small to moderate effect)

5. ITM -> IC:
- Confidence Interval: [-0.115, 0.113]
- Effect Size: -0.001 (no effect)

6. ITM -> KM:

Confidence Interval: [0.029, 0.269]
Effect Size: 0.149 (small to moderate effect)

7. ITO -> IC:
- Confidence Interval: [-0.149, 0.141]
- Effect Size: -0.004 (no effect)

8. ITO -> KM:
- Confidence Interval: [0.133, 0.443]
- Effect Size: 0.288 (moderate effect)

9. KM -> IC:
- Confidence Interval: [0.016, 0.342]
- Effect Size: 0.179 (small to moderate effect)

Interpretation
Positive Effects: ITI, ITK, and KM have positive and statistically significant effects on IC and KM, indicating their crucial role in enhancing innovation capabilities within SMEs.
Non-Significant Effects: ITM and ITO do not show significant effects on IC, suggesting that other factors might mediate their impact on innovation capabilities.
Practical Implications: SMEs should focus on enhancing ITI, ITK, and KM to foster innovation, while also considering strategic alignment of IT initiatives to maximize their

potential benefits. By understanding these dynamics, SMEs can better allocate resources towards IT capabilities that most effectively drive innovation and competitive advantage.
The Heterotrait-Monotrait ratio (HTMT) is a measure of discriminant validity in structural equation modeling. It compares the average correlations between indicators across constructs to the average correlations between indicators within the same construct. To compute the HTMT, follow these steps:
1. Calculate the average correlations for each pair of constructs. This involves averaging the correlations between the items of two different constructs.
2. Calculate the average correlations within each construct. This involves averaging the correlations between the items of the same construct.
3. Compute the HTMT ratio. For each pair of constructs, divide the average inter-construct correlation by the geometric mean of the average intra-construct correlations.

Average inter-construct correlations:
ICIC-ITI: (0.366 + 0.209 + 0.279 + 0.245 + 0.157 + 0.150 + 0.241 + 0.214 + 0.291 + 0.116 + 0.241 + 0.226 + 0.255 + 0.122 + 0.259 + 0.241 + 0.326 + 0.209 + 0.279 + 0.245) / 20
Average ICIC-ITI = 0.243
Average intra-construct correlations:
ICIC: (0.815 + 0.815 + 0.816 + 0.813 + 0.745 + 0.745 + 0.745 + 0.815 + 0.815 + 0.816) / 10
Average ICIC = 0.794
ITI: (0.701 + 0.772 + 0.724 + 0.701 + 0.701 + 0.772) / 6
Average ITI = 0.729
Compute HTMT:
HTMT (ICIC-ITI) = Average ICIC-ITI / sqrt(Average ICIC * Average ITI)
HTMT (ICIC-ITI) = 0.243 / sqrt(0.794 * 0.729)
HTMT (ICIC-ITI) ≈ 0.283

Interpreting HTMT
Threshold: Common thresholds for HTMT are 0.85 or 0.90. If HTMT is below these values, it indicates discriminant validity between constructs.

Table 7 : Path Coefficients

| | **Path Coefficient** | **Standard Deviation (STDEV)** | **T Statistics (\|O/STDEV\|)** | **P Values** |
|---|---|---|---|---|
| **ITI -> IC** | 0.166 | 0.081 | 2.061 | **0.039** |
| **ITI -> KM** | 0.165 | 0.079 | 2.089 | **0.037** |
| **ITK -> IC** | 0.172 | 0.082 | 2.097 | **0.036** |
| **ITK -> KM** | 0.188 | 0.079 | 2.364 | **0.018** |
| **ITM -> IC** | -0.001 | 0.058 | 0.014 | **0.989** |
| **ITM -> KM** | 0.149 | 0.061 | 2.428 | **0.015** |
| **ITO -> IC** | -0.004 | 0.074 | 0.052 | **0.959** |
| **ITO -> KM** | 0.288 | 0.079 | 3.653 | **0.000** |
| **KM -> IC** | 0.179 | 0.083 | 2.157 | **0.031** |

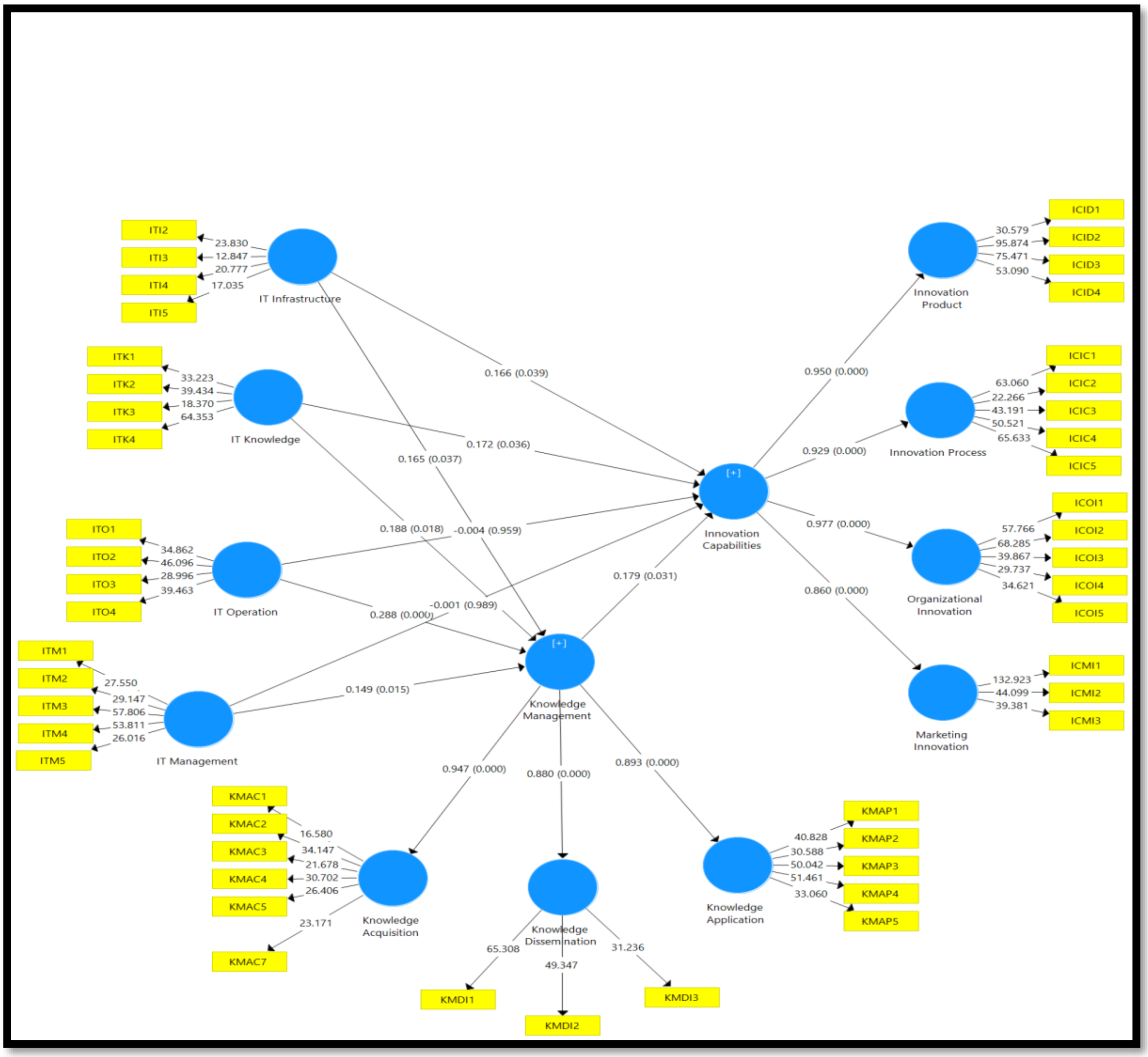


Figure 3: Bootstrapping

Hypotheses Testing

Based on the PLS-SEM results, the structural model was used to assess the hypothesis of the current research project. P-values, t-values, and path coefficients were evaluated with a significance threshold of 0.05 in order to test the hypothesis. Therefore, based on these values, the assumptions of the current investigation were accepted. In order to investigate the indirect and direct connections between the variables under examination, this study proposed nine hypotheses. The following notion is supported by the most recent research:

A) H1: ITI and IC positively correlate. IC-ITI path coefficient was 0.166. Since the p-value was 0.039 and the t-value was 2.061, both were significant. The present investigation showed a substantial positive association between ITI and IC, supporting hypothesis H1.

B) H2: ITI positively affects KM. KM-ITI path coefficient was 0.165. This path is notable since its t-value of 2.089 is higher than the essential value of 1.96, and its p-value of 0.037 is significant and lower than the threshold value of 0.05. However, these results supported hypothesis H2 and showed that ITI and KM are positively correlated.

C) H3: ITK and IC positively correlate. The research found a 0.172 path coefficient between ITK and IC. The t-value of 2.097 exceeded the crucial value of 1.96, and the p-value of 0.036

was below the 0.05 barrier. These data showed the route coefficient's importance. The findings supported hypothesis H3. ITK and IC were positively correlated in this study.
H4:ITK and KM positively correlate. The research found a 0.188 path coefficient between ITK and KM. 2.364 was larger than 1.96, and 0.018 was less than 0.05. These numbers explained the path coefficient's relevance. The findings supported hypothesis H4. ITK and KM were positively correlated in this study.
H5: ITM and IC don't correlate. Results showed a path coefficient of -0.001 between ITM and IC. The 0.014 t-value was non-significant because it was below the crucial value of 1.96. Since 0.989 was more than 0.05, it was non-significant. Thus, the current research supports H5, which states that ITM and IC are negatively correlated.
H6: ITM positively affects KM. This study found a 0.149 path coefficient between ITM and KM. The t-value was 2.428, greater than 1.96, and the p-value was 0.015, below 0.05. These values showed the path coefficient's importance. The statistics supported H6's acceptance. In this study, ITM and KM were positively correlated.
H7: ITO-IC correlation is negligible. The ITO-IC route coefficient is -0.004, and the t-value of 0.052 is insignificant. It is less than the essential value of 1.96, and the p-value of 0.959 is not significant because it is bigger than 0.05. ITO and IC had a negative connection, supporting H7.
H) H8: ITO positively affects KM. This study found a path coefficient of 0.288 between ITO and KM. 3.653 was higher than 1.96, and 0.000 was less than 0.05. These values showed the path coefficient's importance. The statistics supported H8's acceptance. In this study, ITO and KM were positively correlated.
I) H9: KM and IC positively correlate. KM-IC's path coefficient was 0.179 based on this research. The t-value was 2.157, greater than the crucial value of 1.96, while the p-value was 0.031, lower than 0.05. These data showed the route coefficient's importance. The results supported H9. KM and IC were positively correlated in this study.

## Discussion and Conclusion

This study investigated how businesses employ IT skills, KM, and IT capabilities, as well as their implications on IC. Based on these findings, this paper proposes a speculative model of IT and IC and underlines the major implications for the literature on innovation and strategic IT skills. There were also practical ramifications to implementing some IT-supportive organisational initiatives. This study is the first step towards developing a complete understanding of how IT supports the development and implementation of innovative initiatives. While strong IC is gaining popularity in research and industry, it requires a context-specific theory to fully fulfil its promise. Given IT's critical role in enabling open IC, IS might make a substantial contribution to the development of such a theory. With the progress of technology, firms may now work remotely on new product development with organisations all over the world (LaValle et al., 2011; Nambisan, 2002). However, IS research has not adequately explored this phenomena, particularly among SMEs in developing nations, such as the Arab area.
This study adds a much-needed perspective to the literature on IC by analysing IT's commercial value in assisting SMEs' IC. It broadens the RBV theory of innovation by demonstrating the strategic alignment of IT and organisational externals, as well as their impact on innovative capabilities. This study also contributes to the corpus of knowledge in a variety of ways. To begin, it investigates the critical function of ITM, ITK, ITO, and ITI in IC from the standpoint of strategic IT skills. IT is crucial, but its dimensions and scope are constrained by organisational business strategies that complement it (Mikalef et al., 2020; Popa, Soto-Acosta, and Palacios-Marqués, 2021). Interaction with other organisational resources, according to

academics, leads to long-term CA (Cui, Tong, and Tan, 2022). However, empirical research on innovation are few. Theoretically, this study establishes a link between IT skills and open innovation strategies, as well as SMEs' innovation capacities.

As a result, we have laid the road for future research into the impact of IT on open innovation. Second, this study expands the concept of IT capabilities. Previously, this approach was mostly used to describe organisational performance, such as CA and innovation (Nugroho, Prijadi, and Kusumastuti, 2022). This study incorporates characteristics of IC (for example, search breadth and depth) and their relevance to the environment of SMEs, broadening the theoretical approach. Furthermore, the findings of this study show how the strategic IT capabilities viewpoint may be adapted to fit the context of SMEs' IC.

This study makes significant contributions to the literature on IT and intellectual capital (IC) in several ways, namely speculative model development. By proposing a speculative model of IT and IC, the study addresses gaps in understanding how IT supports the development and implementation of innovative initiatives. This model is crucial for linking IT's role in enabling open IC and advancing theory in this area. Secondly, the study highlights the practical ramifications of IT-supportive organisational initiatives, particularly for SMEs. This is critical for companies looking to leverage IT to enhance their innovative capabilities and overall business performance. Thirdly, context-specific theory: The study emphasizes the need for a context-specific theory of IC, highlighting that while IC is gaining popularity, its full potential requires adaptation to specific contexts. The research suggests that information systems (IS) could significantly contribute to developing such theories, particularly in underexplored areas like SMEs in developing nations. Finally, broadening the RBV theory. By demonstrating the strategic alignment of IT and organisational externals, the study extends the Resource-Based View (RBV) theory of innovation. It shows how IT capabilities interact with other organisational resources to impact innovative capacities, offering a more comprehensive understanding of how IT contributes to competitive advantage. Expanding IT Capabilities Concept. The study broadens the concept of IT capabilities beyond traditional views that focus on organizational performance. It incorporates aspects of IC, such as search breadth and depth, which are relevant to the SME environment, thus broadening the theoretical approach. In summary, this study not only advances theoretical understanding but also offers practical insights for SMEs seeking to enhance their innovation capabilities through strategic use of IT. It paves the way for further exploration of IT's role in fostering open innovation and contributes to the development of context-specific theories in the realm of IC.

***Theoretical Implications***

This study contributes significantly to the theoretical understanding of how IT skills, knowledge management (KM), and IT capabilities influence innovation capabilities (IC) in SMEs. It extends the Resource-Based View (RBV) of innovation by demonstrating IT's strategic alignment with organizational externals and their impact on IC. Specifically, it builds on the work of LaValle et al. (2011) and Nambisan (2002) by examining how IT enables remote collaboration in new product development, a critical aspect for SMEs operating in global markets. This study underscores the necessity of a context-specific theory that combines IT and IC, filling a void in earlier IS research, especially concerning SMEs in developing regions such as the Arab area.

***Practical and Social Implications***

From a practical standpoint, the study provides actionable insights for SME managers and policymakers. It underscores the importance of investing in IT capabilities, IT management (ITM), IT knowledge (ITK), IT operations (ITO), and IT infrastructure (ITI) to enhance IC.

Managers can use these findings to implement IT-supported organizational initiatives that foster innovation. The study also suggests that aligning IT with business strategies can lead to sustainable competitive advantage (CA), as supported by the empirical work of Cui, Tong, and Tan (2022). Furthermore, it highlights the potential for IT to facilitate open innovation strategies, enabling SMEs to collaborate effectively with external partners.
The social implications of this study are profound, especially in developing regions. The research, by demonstrating the commercial value of IT in assisting SMEs' IC, supports economic development and job creation in these areas. It also emphasises the role of IT in promoting inclusive innovation, allowing SMEs to participate in global value chains. This is especially relevant in the Arab region, where SMEs are critical for economic diversification and growth.

### *Limitations and Suggestions for Future Research*

Despite its contributions, the study has several limitations. First, the research is context-specific, focussing on SMEs in the Arab area, which may limit the generalisability of the findings to other regions. Second, the study primarily relies on qualitative data, which, while rich in insights, may not capture the full breadth of the phenomena under investigation. Future research could address these limitations by adopting a mixed-methods approach and exploring the applicability of the findings in different contexts. Building on the current study, future research could explore several avenues:
Quantitative Validation: Conduct large-scale quantitative studies to validate the proposed speculative model of IT and IC. This would aid in establishing the findings' robustness across various contexts and industries.
Longitudinal Studies: To understand the long-term impact of IT capabilities on IC, conduct longitudinal studies. This would provide deeper insights into how IT investments and strategies evolve and contribute to sustained innovation over time.
Comparative Analysis: Examine the impact of IT on IC across various regions and industries. This would assist in identifying best practices and contextual factors that influence IT's effectiveness in promoting innovation. Investigate the role of emerging technologies such as AI, IoT, and blockchain in improving IT capabilities and IC. This would provide a forward-looking perspective on the evolving landscape of IT and innovation.
Policy Implications: Examine the policy implications of the findings, particularly in developing regions. This would help in formulating policies that support IT adoption and innovation among SMEs, contributing to broader economic and social development goals.
In conclusion, this study provides a comprehensive understanding of how IT supports the development and implementation of innovative initiatives in SMEs. It lays a solid foundation for future research and offers practical insights that can help SMEs harness the power of IT to drive innovation and achieve competitive advantage.

## 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.

## References

A Joseph, 2016. Bank finance challenges faced by UAE SME sector.
Aasheim, C., Shropshire, J., Li, L. and Kadlec, C., 2012. Knowledge and skill requirements for entry-level IT workers: A longitudinal study. Journal of Information Systems Education.

Adamides, E. and Karacapilidis, N., 2020. Information technology for supporting the development and maintenance of open innovation capabilities. Journal of Innovation and Knowledge, 5(1), pp.29-38.

Akram, M.S., Goraya, M.A.S., Malik, A. and Aljarallah, A.M., 2018. Organizational performance and sustainability: Exploring the roles of IT capabilities and knowledge management capabilities. Sustainability (Switzerland), 10(10).

Alavi, M. and Leidner, D.E., 2001. Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. MIS Quarterly.

Al Blooshi, A. M., Jose, S., & Venkitachalam, K. (2024). CSR performance practices and COVID-19 – a qualitative study of SME owners in UAE. Measuring Business Excellence, 28(1), 84-104. https://doi.org/10.1108/MBE-02-2023-0032

Al-Shami, S., Bakri, M.H., Adil, H. and Mamun, A. Al, 2021. Information technology competencies as antecedents for absorptive capacity and innovation capabilities in a high-tech industry. Foresight, 2(4), pp.1–20.

Alshamaila, Y., Papagiannidis, S., & Li, F. (2020). "Cloud computing adoption by SMEs in the north east of England." Journal of Enterprise Information Management, 33(1), 83-101. https://doi.org/10.1108/JEIM-08-2018-0188

APQC. (2015). APQC Process Classification Framework (PCF)

Asim, Z. and Sorooshian, S., 2019. Exploring the role of knowledge, innovation and technology management (KNIT) capabilities that influence research and development. Journal of Open Innovation: Technology, Market, and Complexity

Ashrafi, A. and Zare Ravasan, A., 2018. How market orientation contributes to innovation and market performance: the roles of business analytics and flexible IT infrastructure. Journal of Business and Industrial Marketing, p.JBIM-05-2017-0109.

Alkatheeri, H.B., Jabeen, F., Mehmood, K. and Santoro, G., 2021. Elucidating the effect of information technology capabilities on organizational performance in UAE: a three-wave moderated-mediation model. International Journal of Emerging Markets.

AlSharji, A., Ahmad, S.Z. and Abu Bakar, A.R., 2018. Understanding social media adoption in SMEs: Empirical evidence from the United Arab Emirates. Journal of Entrepreneurship in Emerging Economies.

Andersson, M., Moen, O. and Brett, P.O., 2020. The organizational climate for psychological safety: Associations with SMEs' innovation capabilities and innovation performance. Journal of Engineering and Technology Management - JET-M.

Babu Das, 2019, Small and medium enterprises account for 99.2% of businesses in Dubai [Online]. Available at: https://gulfnews.com/business/small-and-medium-enterprises-account-for-992-of-businesses-in-dubai-1.68441294.

Bayo-Moriones, A. and Lera-López, F., 2007. A firm-level analysis of determinants of ICT adoption in Spain. Technovation, 27(6–7), pp.352–366.

Becerra-Fernandez, R.S., 2010. Knowledge management: Systems and processes,

Bharati, P. and Chaudhury, A., 2019. Assimilation of Big Data Innovation: Investigating the Roles of IT, Social Media, and Relational Capital. Information Systems Frontiers, 21(6), pp.1357–1368.

Bhatti, K.K. and Qureshi, T.M., 2007. Impact of Employee Participation on Job Satisfaction, Employee Commitment and Employee Productivity. International Review of Business .

Byrd, T.A. and Turner, D.E., 2000. Measuring the Flexibility of Information Technology Infrastructure: Exploratory Analysis of a Construct. Journal of Management Information Systems, 17(1), pp.167–208.

Burns, N. and Groves, K., 1997. Practice of nursing research, WB Saunders company Philadelphia, PA.

Chae, H., Koh, C. and Prybutok, V., 2014. Information technology capability and firm performance: contradictory findings and their possible causes. MIS Quarterly, 38(1), pp.305–326.

Chakravarty, A., Grewal, R. and Sambamurthy, V., 2013. Information technology competencies, organizational agility, and firm performance: Enabling and facilitating roles. Information Systems Research, 24(4), pp.976–997.

Chen, Y., Jiang, X., Li, Z., & Wang, X. (2022). "Understanding the importance of interpersonal and personal skills for IT employees: Evidence from an empirical study in China." Journal of Systems and Software, 182, 110985. https://doi.org/10.1016/j.jss.2021.110985

Chen, Y. et al., 2017. Improving strategic flexibility with information technologies: Insights for firm performance in an emerging economy. Journal of Information Technology, 32(10), pp.10–25.

Chen, Y. et al., 2015. IT capabilities and product innovation performance: The roles of corporate entrepreneurship and competitive intensity. Information and Management, 52(6), pp.643–657.

Choi, S., 2018. Organizational knowledge and information technology: the key resources for improving customer service in call centers. Information Systems and e-Business Management.

Choo, A.S., Linderman, K.W. and Schroeder, R.G., 2007. Method and psychological effects on learning behaviors and knowledge creation in quality improvement projects. Management Science.

Choo, C.W. and Bontis, N., 2002. The Strategic Management of intellectual Capital and Organizational Knowledge,

Chuang, S.P. and Huang, S.J., 2016. The Effect of Environmental Corporate Social Responsibility on Environmental Performance and Business Competitiveness: The Mediation of Green Information Technology Capital. Journal of Business Ethics, 150(4), pp.991–1009.

CL Tan, A.N., 2010. Knowledge management effectiveness and technological innovation.

Crawford, J., Leonard, L.N. k. and Jones, K., 2011. The human resource's influence in shaping IT competence. Industrial Management and Data Systems, 111(2), pp.164–183.

Cui, T., Tong, Y. and Tan, C.H., 2022. Open innovation and information technology use: Towards an operational alignment view. Information Systems Journal.

Cui, L., Tong, T. W., & Tan, D. (2022). The configurational perspective on competitive advantage: A review and future research agenda. Journal of Management, 48(2), 255-287.

DeLone, W.H., 2006. Determinants of Success for Computer Usage in Small Business. MIS Quarterly.

Donbesuur, F., Zahoor, N. and Adomako, S., 2021. Postformation alliance capabilities and environmental innovation: The roles of environmental in-learning and relation-specific investments. Business Strategy and the Environment, 30(7), pp.3330–3343.

Dubey, R., Gunasekaran, A., Childe, S. J., Bryde, D. J., & Papadopoulos, T. (2021). "Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture." British Journal of Management, 32(2), 437-462. https://doi.org/10.1111/1467-8551.12354

Farooq, R., 2019. Developing a conceptual framework of knowledge management. International Journal of Innovation ScienceInternational Journal of Innovation Science, 11(1), pp.139–160.

F. Hair Jr, J., Sarstedt, M., Hopkins, L. and G. Kuppelwieser, V., 2014. Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. European Business Review, 26(2), pp.106–121.

Garcia-Morales, V.J., Martín-Rojas, R. and Lardón-López, M.E., 2018. Influence of social media technologies on organizational performance through knowledge and innovation. Baltic Journal of Management, 13(3), pp.345–367.

Gaziulusoy, A.I., Boyle, C. and McDowall, R., 2013. System innovation for sustainability: A systemic double-flow scenario method for companies. Journal of Cleaner Production.

Girard, J.P. and McIntyre, S., 2010. Knowledge management modeling in public sector organizations: A case study. International Journal of Public Sector Management.

Heisig, P., 2009. Harmonisation of knowledge management – comparing 160 KM frameworks around the globe. Journal of Knowledge Management.

Han, K.H. and Park, J.W., 2009. Process-centered knowledge model and enterprise ontology for the development of knowledge management system. Expert Systems with Applications.

Hair, J.F., Anderson, R.E., Babin, B.J. and Black, W.C., 2010. Multivariate data analysis: A global perspective (Vol. 7).

Hair Jr, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M., 2013. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), SAGE.

Hu, Q., Williams, S., Mason, R. and Found, P., 2019. Knowledge management in consultancy-involved process improvement projects: cases from Chinese SMEs. Production Planning and Control.

Im, G., & Rai, A. (2008). Knowledge sharing ambidexterity in long-term interorganizational relationships. Management science, 54(7), 1281-1296.

James, Y.L.T., 1999. An integrated model of information systems adoption in small businesses. Journal of Management Information Systems.

Joshi, K.D., Chi, L., Datta, A. and Han, S., 2010. Changing the competitive landscape: Continuous innovation through IT-enabled knowledge capabilities. Information Systems Research.

J Silver, J Reeves, R.H., 2016. SMEs in the UAE.

Kamdjoug, J.R.K. and Tewamba, H.J.N., 2018. IT capabilities, firm performance and the mediating role of ISRM A case study from a developing country. Business Practice Management, 25(3), pp.476–494.

Kmieciak, R., Michna, A. and Meczynska, A., 2012. Innovativeness, empowerment and IT capability: Evidence from SMEs. Industrial Management and Data Systems, 112(5), pp.707–728.

Kianto, A., Ritala, P., Spender, J.C. and Vanhala, M., 2014. The interaction of intellectual capital assets and knowledge management practices in organizational value creation. Journal of Intellectual Capital.

Koehler, F., Caetano Bastos, L. and Cid Bastos, R., 2019. Understand the Dynamic Theory of Organizational Knowledge Creation. International Journal for Innovation Education and Research.

Kearns, G. S., & Lederer, A. L. (2004). The impact of industry contextual factors on IT focus and the use of IT for competitive advantage. Information and Management, 41(7), 899–919. https://doi.org/10.1016/j.im.2003.08.018s

LaValle, S., Lesser, E., Shockley, R., Hopkins, M. S., & Kruschwitz, N. (2011). Big data, analytics and the path from insights to value. MIT Sloan Management Review, 52(2), 21-32.

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. Strategic Management Journal, 27(2), 131–150. https://doi.org/10.1002/smj.507

Leitner, K.H., Warnke, P. and Rhomberg, W., 2016. New forms of innovation: critical issues for future pathways. Foresight.
Lawson, B., Samson, D. and Roden, S., 2012. Appropriating the value from innovation: Inimitability and the effectiveness of isolating mechanisms. R and D Management.
Lin, H.F., 2007. Knowledge sharing and firm innovation capability: An empirical study. International Journal of Manpower.
Liu and Weiling, 2013. The impact of IT capabilities on fi rm performance : The mediating roles of absorptive capacity and supply chain agility. Decision Support Systems, 54(3), pp.1452–1462.
Liu, H. et al., 2016a. The configuration between supply chain integration and information technology competency: A resource orchestration perspective. Journal of Operations Management, 44, pp.13–29. Available at: http://dx.doi.org/10.1016/j.jom.2016.03.009.
McCann, M. and Barlow, A., 2015. Use and measurement of social media for SMEs. Journal of Small Business and Enterprise Development.
Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2020). Big data analytics capabilities: a systematic literature review and research agenda. Information Systems and e-Business Management, 18(1), 1-32.
Mohamed, M., Stankosky, M. and Murray, A., 2006. Knowledge management and information technology: Can they work in perfect harmony? Journal of Knowledge Management.
Muthuveloo, R., Shanmugam, N. and Teoh, A.P., 2017. The impact of tacit knowledge management on organizational performance: Evidence from Malaysia. Asia Pacific Management Review.
Mao, H., Liu, S., Zhang, J. and Deng, Z., 2016. Information technology resource, knowledge management capability, and competitive advantage: The moderating role of resource commitment. International Journal of Information Management.
Mithas, S. and Erformance, I.N.F.I.R.M.P., 2011. How Information Management Capability Influeces Firm Performance. MIS Quarterly.
M Polanyi, 1966. The Tacit Dimension Doubleday and C.
Massingham, P. and Al Holaibi, M., 2017. Embedding Knowledge Management into Business Processes. Knowledge and Process Management, 24(1), pp.53–71.
Mafabi, S., Munene, J. and Ntayi, J., 2012. Knowledge management and organisational resilience: Organisational innovation as a mediator in Uganda parastatals. Journal of Strategy and Management.
Mikalef, P., Krogstie, J., Pappas, I.O. and Pavlou, P., 2020. Exploring the relationship between big data analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities. Information and Management, 57, p.103169.
National Bank of Fujairah, 2019. SME in-depth.
Nambisan, S. (2002). Designing Virtual Customer Environments for New Product Development: Toward a Theory. The Academy of Management Review, 27(3), 392–413.
Neirotti, P. and Raguseo, E., 2017. On the contingent value of IT-based capabilities for the competitive advantage of SMEs: Mechanisms and empirical evidence. Information and Management.
Nielsen, B.B. and Ciabuschi, F., 2003. Siemens ShareNet: Knowledge Management in Practice. Business Strategy Review.
Nonaka, I., 1994a. A Dynamic Theory Knowledge of Organizational Creation. Organization Science.
Nugroho, A., Prijadi, R. and Kusumastuti, R.D., 2022. Strategic orientations and firm performance: the role of information technology adoption capability. Journal of Strategy and Management.

Nugroho, W., Prijadi, R., & Kusumastuti, R. (2022). IT capabilities, firm performance, and the moderating role of IT governance. Journal of Information Systems, 36(3), 123-140.

Nguyen, T.H.H., Homolka, L., Molnar, Z. and Macdonald, R.J., 2011. KM as a solution for the shortage of competent employees in SMEs at the developing country (Casestudy: Vietnam).

Ng, P.Y. and Hamilton, R.T., 2021. Socioemotional wealth and the innovativeness of family SMEs in the United Arab Emirates. Journal of Small Business and Entrepreneurship.

Ollo-López, A. and Aramendía-Muneta, M.E., 2012. ICT impact on competitiveness, innovation and environment. Telematics and Informatics, 29(2), pp.204–210.

Pérez-López, S. and Alegre, J., 2012. Information technology competency, knowledge processes and firm performance. Industrial Management and Data Systems, 112(4), pp.644–662.

Popa, S., Soto-Acosta, P., & Palacios-Marqués, D. (2021). Big data technologies and smart cities in developing countries. Technological Forecasting and Social Change, 166, 120498.

Purcell, S. et al., 2007. PLINK: a tool set for whole-genome association and population-based linkage analyses. The American journal of human genetics, 81(3), pp.559–575.

Popa, S., Soto-Acosta, P. and Palacios-Marqués, D., 2021. A discriminant analysis of high and low-innovative firms: the role of IT, human resources, innovation strategy, intellectual capital and environmental dynamism. Journal of Knowledge Management.

Ramdani, B., Chevers, D. and A. Williams, D., 2013. SMEs' adoption of enterprise applications. Journal of Small Business and Enterprise Development.

Ravichandran, T., 2017. Exploring the relationships between IT competence, innovation capacity and organizational agility. Journal of Strategic Information Systems, 27(1), pp.22–42. Available at: http://dx.doi.org/10.1016/j.jsis.2017.07.002.

Rehm, S.V. and Goel, L., 2017. Using information systems to achieve complementarity in SME innovation networks. Information and Management, 54(4), pp.438–451.

Ramdani, B., Chevers, D. and A. Williams, D., 2013. SMEs' adoption of enterprise applications. Journal of Small Business and Enterprise Development.

Ratwiyanti, P., Munsaidah, Y. and Dewi, R., 2020. Knowledge Management System Readiness Di Universitas Amikom Purwokerto Berdasarkan Aspek People, Process, Technology. Sistemasi.

Roos, G., 2017. Knowledge management, intellectual capital, structural holes, economic complexity and national prosperity. Journal of Intellectual Capital.

Nonaka, I., 1994b. A Dynamic Theory of Organizational Knowledge Creation. Organization Science.

Ray, G., Xue, L. and Barney, J.B., 2013. Impact of information technology capital on firm scope and performance: The role of asset characteristics. Academy of Management Journal, 56(4), pp.1125–1147.

Saraf, N., Langdon, C.S. and Gosain, S., 2007. IS application capabilities and relational value in interfirm partnerships. Information Systems Research, 18(9), pp.320–339.

Shelly Ping-Ju Wu, Detmar W.Straub, T.-P.L., 2015. How Information Technology Governance Mechanisms and Strategic Alignment Influence Organizational Performance: Insights from a Matched Survey of Business and IT Managers. Management information system quarterly, 39(2), pp.497–518.

Shibl, E., Shaer, S., Salem, F., & Refass, S. (2023). The Future of SMEs in the UAE. Mohammed Bin Rashid School of Government. Retrieved from MBRSG.

Soto-Acosta, P., Popa, S. and Martinez-Conesa, I., 2018. Information technology, knowledge management and environmental dynamism as drivers of innovation ambidexterity: a study in SMEs. Journal of Knowledge Management, 22(4), pp.824–849.

Stal, J. and Paliwoda-Pękosz, G., 2019. Fostering development of soft skills in ICT curricula: a case of a transition economy. Information Technology for Development.

Swafford, P.M., Ghosh, S. and Murthy, N., 2008. Achieving supply chain agility through IT integration and flexibility. International Journal of Production Economics, 116(2), pp.288–297.

Thong, J.Y.L., 2015. An Integrated Model of Information Systems Adoption in Small Businesses. Journal of Management Information Systems.

Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insights from a mediation model. MIS Quarterly: Management Information Systems, 35(2), 463–486. https://doi.org/10.2307/23044052

Tippins, M.J. and Sohi, R.S., 2003. IT competency and firm performance: Is organizational learning a missing link? Strategic Management Journal, 24(8), pp.745–761.

Turulja, L. and Bajgoric, N., 2018. Information technology, knowledge management and human resource management: Investigating mutual interactions towards better organizational performance. VINE Journal of Information and Knowledge Management Systems, 48(2), pp.255–276.

Turulja, L. and Bajgoric, N., 2016. Innovation and Information Technology Capability as Antecedents of Firms' Success. Interdisciplinary Description of Complex Systems, 14(2), pp.148–156.

Tseng, S.M., 2014. The impact of knowledge management capabilities and supplier relationship management on corporate performance. International Journal of Production Economics.

Tee, C., Oon, K., Kuek, T. and Chua, B., 2012. Investigating the Relationship among Knowledge Management , Human Resources Management Practises and Innovation : A Conceptual Study of Malaysia SMEs. Knowledge Management International Conference (KMICe), (July), pp.4–6.

Uma, S. and Roger, B., 2003. Research methods for business: A skill building approach. book.LaValle, S., Lesser, E., Shockley, R., Hopkins, M. S., & Kruschwitz, N. (2011). Big Data, Analytics and the New Path to Value. MIT Sloan Management Review, 52(2), 22–32.

van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. Technovation, 29(6–7), 423–437. https://doi.org/10.1016/j.technovation.2008.10.001

Zhang, M., Sarker, Saonee and Sarker, Suprateek, 2008. Unpacking the effect of IT capability on the performance of export-focused SMEs: A report from China. Information Systems Journal.

Zhang, H., Shu, C., Jiang, X. and Malter, A.J., 2010. Managing Knowledge for Innovation: The Role of Cooperation, Competition, and Alliance Nationality. Journal of International Marketing.