

DOI: [10.17323/2587-814X.2023.1.66.85](https://doi.org/10.17323/2587-814X.2023.1.66.85)

# The impact of ICT on inter-organizational knowledge sharing for SMEs growth

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## Abstract

It is common knowledge that information and communication technologies (ICTs) have made continuous inroads in the knowledge management field; thus, this study is modeled to examine the impact of ICTs on inter-organizational knowledge sharing (IOKS) and its subsequent effect on the growth of small and medium-sized enterprises (SMEs). The study adopts a descriptive survey design, using the quantitative research approach. Using the simple random sampling technique, a web-based questionnaire was used to collect data from 187 respondents. Results showed that IOKS among SMEs is not carried out to a great extent, which means that it is not a common practice among SMEs. Findings showed that less than half of the SMEs used training programs, internship programs, research collaboration and workshops for IOKS. It further showed that IOKS enhances sales, productivity, profit, organizational assets and equity. This study provides evidence of how ICT systems/tools have been used in IOKS and their impact on the growth of SMEs.

**Keywords:** inter-organizational knowledge sharing, small and medium-sized enterprises, information and communication technologies

**Citation:** Azyabi N.G. (2023) The impact of ICT on inter-organizational knowledge sharing for SMEs growth. *Business Informatics*, vol. 17, no. 1, pp. 66–85. DOI: 10.17323/2587-814X.2023.1.66.85

### Introduction

Generally, the emergence of information and communication technologies (ICTs) has changed practices and procedures in numerous domains. This is evident in knowledge management practices, which include knowledge sharing. IOKS is typically mutually beneficial to all sides involved [1], with the most significant benefit being the integration of ideas [2], which promotes the interchange of concepts on shared goals among collaborating organizations [3]. The relevance and strategic importance of inter-organizational knowledge systems for healthcare providers, government, and other citizens have been demonstrated in several research studies [4, 5]. However, there is no evidence that ICTs have an impact on IOKS in small and medium-sized businesses (SMEs) in terms of SMEs' growth or lack thereof. More importantly, ICTs have permeated all walks of life and it has also been shown that SMEs play a significant role in the driving knowledge-based economy [6, 7]. Moreover, SMEs' growth will positively improve the economic growth of a country [8]. Therefore, it becomes pertinent to understand how SMEs have fared in their use of ICT for inter-organizational knowledge sharing (IOKS) in Saudi Arabia since there is no current empirical evidence in respect of that.

Generally, knowledge has been described by different authors in different contexts. The perspective of this study, however, is viewed from the information science/information systems context, which is the foundation of management information systems. Knowledge is an idea that emanates from human minds and spreads widely when people are interested in its acquisition. It was stated

further that efficient knowledge requires awareness, identification and application of it for the advancement of humanity [9]. Huda et al. [10] described knowledge as a tool that is used in enabling the development of an individual and/or society. This suggests that knowledge is dynamic: it evolves by developing from one shape or form to another in the enhancement of a person, group of people, or societal advancement. Nonaka [11] proposed a four-stage model to explain the process of switching from one type of knowledge to another, which includes socialization-externalization-combination-internalization (SECI).

Socialization is concerned with social interaction among individuals to share and exchange tacit knowledge which can be through training programs, while externalization is the conversion of tacit knowledge into knowledge-bearing resources or tangible innovations [12]. Meanwhile, the combination in the SECI model postulates that inter- and intra-organization knowledge coalesce by collecting, merging, editing, and processing, through the use of computers and other information technologies [13]. Internationalization is the assimilation of explicit knowledge pooled together, for example, an online database, which would enhance the tacit knowledge base of the employees in the union organization [14]. Consequently, the newly acquired knowledge would serve as the basis for employees' new routines at work whereby they will put into practice what they have learned or know. Going by Nonaka's model [11], it is evident that there is a clear distinction between tacit and explicit knowledge. Meanwhile, both tacit and explicit knowledge are considered for this study.

IOKS can be described as a process that concerns the distribution and redistribution of employees' inputs among different organizations, where knowledge can be regarded as the input while sharing is the process [15]. Since there is a dearth of literature on inter-organizational knowledge sharing, some scholars' definitions of knowledge sharing are considered to underpin the explanation of the concept. Teixeira et al. [16] viewed knowledge sharing as the generation and donation of knowledge to enhance innovation or creativity. Loebbecke et al. [17] argued that IOKS concerns interpersonal interactions, team-based systems, network ties and business intelligence. This provides that knowledge sharing is the exchange of business and logistics ideas using techniques such as collaboration, combination, compromise, accommodation, avoidance and competition [18]. Yang [19] showed that the use of internal marketing in knowledge sharing enhances organizational effectiveness. It is important to note that organizational effectiveness does not translate into growth [20, 21].

Hinder et al. [2] found that shared technology is one of the facilitators of IOKS. ICTs play a considerable role in IOKS [22], although the overall influence on SMEs' growth is unknown. Audretsch and Belitski [23] recommended that future studies should provide insights into how resources acquired through inter-organizational knowledge exchange might help SMEs' growth. Meanwhile, Oyebiyi [24] asserted that ICTs are critical for SMEs to improve customer service delivery and remain competitive in their respective industries. Based on this, the goal of this research study is to ascertain how ICT can help facilitate IOKS. Inter-organizational knowledge exchange is critical to SMEs [25, 26]. However, there is no specific evidence of the influence of knowledge sharing on SMEs growth in Saudi Arabia. Thus, this study seeks to fill the identified gap.

Moreover, previous studies [27–29] have been conducted on SMEs' adoption of ICTs for knowledge management, which is regarded as knowledge management systems or knowledge management networks.

Also, some studies have investigated the impact of IOKS on regional sustainable development [30], cultural differences among different organizations [31] and innovative ideas [32]. While these studies showed how the infusion of ICT in IOKS influences sustainable development, cultural differences and innovations, there is no evidence as to how IOKS influences SMEs' growth. Thus, this study seeks to provide empirical evidence that would plug this obvious gap. The study is significant, because it establishes the influence of applying ICT to IOKS, and how that would impact the expansion and growth of SMEs. The article begins with an introduction that presents essential background information which rationalizes the importance of the research study. The first section establishes the gaps that are present in the literature and, based on these, sets out the research questions that the study findings seek to answer. The second section presents a review of literature related to the themes of the study and illustrates the conceptual model that guides the research. The third section is the methodology section, followed by the results, discussion of findings, conclusion, and practical/theoretical implications set out in a sequential manner.

### 1. Research questions

Drawing on the background introduction and rationale for carrying out this study, the following research questions guide the study's overall aim:

1. To what extent are SMEs in Saudi Arabia practicing IOKS?
2. What are the ICT systems/tools used by SMEs in inter-organizational knowledge sharing?
3. To what extent is SMEs growth influenced by inter-organizational knowledge sharing?

### 2. Review of related literature and hypotheses

This section analyses literature related to the use of ICT for facilitating IOKS in SMEs, and the influence of IOKS on SMEs growth.

### 2.1. IOKS in SMEs

IOKS is a relatively recent topic, but it is expanding [33]. Tesavrita et al. [34] used constructs of collaborative engagement activities that include the timeframe (short or long-term collaboration), technological factor, learning mechanism (discussion, training, internship, research collaboration, and workshops) and entity (stakeholders) to propose a conceptual model for IOKS in SMEs (among stakeholders). The framework was tested using data from two Indonesian SMEs, and the results revealed that IOKS occurred through training, research, internships and discussions. IOKS is essential for social and economic development, most especially in service-based and knowledge-based sectors [5]. Ibidunni et al. [35] considered SMEs as being part of the knowledge-based sector, implying that cross-organizational knowledge sharing is possible.

Chong et al. [26] found that SMEs owners in Malaysia consider how to best design an appropriate strategy to collect relevant information from stakeholders, use this information to enhance business growth, learn from relevant stakeholders and sponsor employees to attend conferences or pursue further studies, as is important in IOKS. It was, however, shown that most of the actions required in inter-organizational knowledge exchange are difficult to implement for SMEs, except for the customer-supplier relationship and license ownership. A qualitative study by Al-Jabri and Al-Busaidi [25] revealed that the influencing elements of IOKS among Omani SMEs include donor firm features, recipient firm features, nature of the knowledge, and inter-organizational dynamics. However, risk and trust were found to be the core factors in the IOKS. It was revealed that knowledge exchange among SMEs is accompanied by a degree of trust. Knowledge intensity has a beneficial effect on inter-organizational trust [36]. Furthermore, the result showed a positive significant relationship between inter-organizational trust and SMEs performance.

Li et al. [37] analyzed the influence of IOKS on enterprise resource planning (ERP) deployment. Organizational preparedness, positive benefits and

costs, and external influences were found to be factors that could improve inter-organizational information sharing. Guedda [38] showed that social proximity, leadership style and organizational orientation enhance IOKS. Similarly, Cheng and Fu [39] revealed that both relationship and organizational orientations are essential in promoting cross-organizational knowledge exchange, since they reduce risk in the process of sharing knowledge and improve collaborative behavior. Cheng [40] discovered that in the Taiwanese manufacturing business relational risk is adversely associated with IOKS. Meanwhile, Oliveira et al. [41] showed that trust is essential in inter-organizational relations. This indicates that trust is critical in relational risk and that it is interconnected to the exchange of knowledge among organizations.

### 2.2. Impact of ICT use in facilitating IOKS in SMEs

Nowadays, ICT is crucial to SMEs, and its impact on social, economic and personal development is well-established in the literature [42, 43]. Technologies and tools have been adopted in inter-organizational collaboration [1, 44, 45] and more technologies are emerging for knowledge sharing with the aim of organizational development [46]. Tesavrita et al. [34] revealed that IOKS was practiced by two SMEs in Indonesia both online and offline; hence, there were no technological issues. This indicates that ICT's influence on facilitating knowledge sharing in SMEs may be limited. Scuotto et al. [28] showed that ICT-driven intra-organizational knowledge sharing would improve innovation processes and enhance new product development for SMEs. Chong et al. [26] showed that the technologies used in IOKS among SMEs include social media, extranet, e-mail, customer management systems, desktop computer conferencing, knowledge repository/company database and teleconferencing.

Organizations in the business and health sectors employ repository information sharing and networking tools for IOKS [5]. The study established that ICT influences the knowledge-sharing patterns of different

media, such as text, images, audio and video. However, there is no evidence of the effect of using ICT to facilitate IOKS in SMEs. Al-Busaidi [47] revealed medical doctors' perceptions of the impact of using technologies in IOKS; namely that it resulted in improved staff collaboration, information availability, knowledge-sharing processes, individual learning, and decision-making processes, increased information flow and customer service, saved the organization time and enhanced innovation. Premised on this gap in the literature, this study seeks to provide new insight into SMEs' perspectives.

Altarkait [48] showed that social media have a good social and transactional impact on the inter-organizational interactions of SMEs in Kuwait. Results further showed that the use of social media influences the use of traditional technologies for the inter-organizational exchange of ideas among SMEs. Pérez-González et al. [49] found that adopting social media platforms by SMEs for knowledge sharing has a favorable effect on organizations. Soto-Acosta et al. [50] revealed that technological expertise and competencies have a substantial impact on SMEs' web knowledge sharing. It was shown in another study that technical assistance has a considerable favorable impact on explicit knowledge exchange [51]. This indicates that the significance of technology is unknown in tacit knowledge sharing among SMEs. However, Castaneda and Toulson [52] demonstrated that ICT tools like text messaging and video conferencing enable tacit knowledge exchange, whereas e-mail does not. Burnett [53] established that explicit knowledge sharing plays an important role in technological innovation compared to tacit knowledge sharing. Based on the foregoing, it is hypothesized that:

H1: ICT use has a statistically significant positive effect on IOKS in SMEs.

### 2.3. Influence of IOKS on SMEs growth

Ahokangas et al. [54] showed that IOKS is a daunting task, especially when it is technology-driven and executed by SMEs without a knowledge

management structure. The results further showed that SMEs engage in IOKS when their workload is explosive and there is no alternative to enhance the deliveries. Also, IOKS was found to have a substantial impact on SMEs growth. Chong et al. [26] revealed that the influence of ICT on IOKS is unclear, since the majority of the respondents were neutral regarding the effectiveness of IOKS on corporate performance. Mohsam and Van Brakel [55] found that the strategy taken in sharing both tacit and explicit knowledge determines the success of SMEs in the Western Cape, South Africa and that the IOKS mechanism is a factor of SMEs' competitive advantage.

Cresswell et al. [56] revealed that formal knowledge sharing prompts learning and enhances the growth of an organization. However, it was shown that the formal network in knowledge sharing is more effective when supported by informal networks. Hinder et al. [2] also showed that a hybrid of informal and formal networks in IOKS enhances learning and growth. Al-Jabri and Al-Busaidi [57] revealed that SMEs garnered learning benefits from informal IOKS, and it was discovered that IOKS has no substantial impact on SMEs' innovation performance. Rivera et al. [58] suggested that there is a need for SMEs to consider networks of trust, deference to other SMEs, patience and an enabling work environment. This indicates that there is a need for credibility and belief among SMEs that are participating in IOKS, whether in an informal or formal domain.

Alashwal et al. [59] showed that there is a statistically significant, positive association between IOKS and SMEs performance in the construction industry in Kuala Lumpur, Malaysia. The results showed that inter-organization learning, externalization (tacit knowledge to explicit knowledge), and internalization (explicit knowledge to tacit knowledge) improve SMEs' performance. Hsieh [60] revealed that a successful SMEs adopts a knowledge-sharing mechanism that includes a feedback apparatus, language diversity, personal focus and the availability of multiple cues. Chong et al. [26] found that it is better to share external (explicit) knowledge than internal (implicit) knowledge in inter-organizational knowledge exchange. It was

shown that IOKS strategies have been found to have a substantial impact on SMEs success. SMEs growth was not explored by all of the studies in the extant literature, which studied inter-organizational knowledge sharing. Shepherd and Wiklund [61] pointed out that the elements used for measuring SMEs growth include sales, employees, profit, assets and equity. Meanwhile, the impact of IOKS among different organizations was studied in relation to SMEs success. As a result, the goal of the research is to determine how IOKS affects SMEs growth. The following hypothesis will be tested based on the foregoing:

H2: IOKS has a statistically significant, positive effect on SMEs growth.

Moreover, understanding the influence of ICT-enabled IOKS on SMEs' growth may be over simplistic without having evidence on how each ICT tool determines SMEs' growth. Thus, this study attempts to establish how each ICT system/tool predicts SMEs' growth. This will enable SMEs owners to be informed about the most relevant and effective ICT tool to adopt in IOKS. Gaviria-Marin et al. [62] found that ICT has an enabling effect on more complex competencies like knowledge management capability and product innovation flexibility, which serve as mediating variables to add value and boost performance through innovation in business. Ceci et al. [63] established that ICT tools promote creative, strategic and practical tasks when using knowledge sharing in the innovation process. Ammirato et al. [64] concluded in their study that there is low awareness of using social media for knowledge transfer among B2B companies in the Finnish technology industry. This indicates that social media may not significantly predict SMEs' growth. Byosiere et al. [65] showed that social networks do not enhance explicit knowledge, but they enhance tacit knowledge. This was established in an attempt to establish the interrelationships among social networks, knowledge types and knowledge sources. Therefore, this study will test the alternate hypothesis which states that:

H3: ICTs are statistically significant predictors of SMEs' growth.

### 3. Theoretical framework

This study is underpinned by the open innovation theory. The relationships of the theory with the major themes of the study were established.

Remneland-Wikhamn and Knights [66] chronicled that the open innovation model was proposed by Chesbrough [67]. They noted that the proponent argues that companies tend to protect their innovation by barring any form of knowledge exchange with the external environment, which is regarded as "closed innovation." However, it was shown that a seamless exchange of relevant and appropriate knowledge would expand market opportunities and growth. External knowledge that would enhance organizational performance should be integrated to enhance business performance [68]. This indicates that IOKS is hinged on a business model. Internal knowledge that does not support the business model will be shared. The shift in the practice of open innovation management in organizations gave rise to the idea of open innovation theory [68]. Santoro et al. [69] showed that SMEs in the United States rely on their customers for external knowledge when developing a new product or service.

The move from closed to open innovation theory emphasized the importance of external sources of knowledge and ideas in the innovation process [69, 70]. The open innovation paradigm encourages a systematic approach to rely on both internal and external resources, as well as maximizing both internal and external channels to boost market presence and buoyancy [67]. Gassman and Enkel [71] stated that openness takes place when there is a search for a new source of knowledge from external partners to enhance the internal process; generating and bringing new ideas to market and passing on technology and knowledge to others, and relying on the shared knowledge or ideas to create a synergy that would enhance collaboration. Meanwhile, Eseryel [72] showed that ICTs enhance knowledge creation for open innovation through effective knowledge inflow and outflow. It was established that SMEs size and technology intensity are considered factors of the extent of open innovation in an organization [73, 74].



Open innovation has been studied from the perspectives of open innovation mode, organizational cooperation, and open innovation performance [75]. The authors stated further that open innovation theory is difficult to understand, owing to the lack of clarity on its fundamental concept and measures. Research and technical systems are critical elements in open innovation theory, which guides the perspectives of innovation in SMEs through IOKS [67]. Van de Vrande et al. [74] found that, in comparison with small organizations, medium-sized enterprises are heavily involved in open innovation. The results, however, revealed that SMEs use open innovation to improve their performance in terms of meeting customer needs and gaining a competitive edge. Howells et al. [76] adopted the theory to explore the impact of interactions and collaborations among universities and other higher institutions of learning. Subrahmanya et al. [77] concluded that innovation in sales is a significant contributor to SMEs growth in terms of gross value added. Hence, the result of open innovation, which stems from the integration of external knowledge, contributes to SMEs growth. Studies [78, 79] have shown that technological innovation enhances SMEs growth. Contextually, this implies that ICT-supported, IOKS among SMEs can facilitate their growth. The contemporary technological innovation among SMEs includes the adoption of social media, computerized record management and digital marketing [80]. Love and Roper [81] concluded that, aside from productivity, growth (sales) is another important measure for innovation in SMEs.

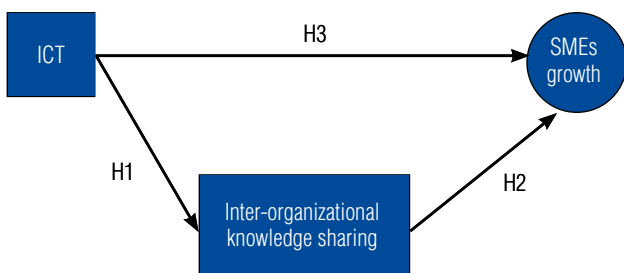


Fig. 1. Conceptual model.

The conceptual model is the framework that guides the interconnected relationships that exist among the variables in this study. The conceptual model is presented in Fig. 1. It is proposed that ICT tools (such as social media, extranet, e-mail, customer management systems, desktop computer conferencing, knowledge repository/company database and teleconferencing) have a statistically positive effect on IOKS among SMEs. Moreover, the model illustrates that ICT-enabled IOKS has a statistically significant, positive effect on firm growth. It is also proposed in the model that IOKS (such as discussions, training, internship, research collaboration, and workshops) has a positive effect on SMEs growth (sales, profit, employee productivity, assets and equity).

#### 4. Methodology

A descriptive survey research design was adopted in this study as it seeks to describe a particular phenomenon [82]. The quantitative research approach was chosen, because it allows the collection of numerical data from a wide range of individuals or entities [83]. The data were collected using a five-point Likert scale questionnaire with the following scale: Strongly Agree – 5 to Strongly Disagree – 1; Great Extent – 5 to No Extent – 1. Two scholars in the area of knowledge management were given the questionnaire to ensure that the items on the questionnaire were understandable and could elicit the necessary information from the respondents. The questionnaire was revised based on the comments and observations of the scholars, and it was then designed to be a web-based questionnaire. Mubasher [84] reported that the total number of SMEs in the Kingdom of Saudi Arabia (KSA) is 614 000, which represents the population of the study. The simple random sampling technique was adopted for the study. This kind of technique gives equal opportunity to all SMEs owners in KSA [85]. Furthermore, the Raosoft sample size calculator was used to determine the 384-sample size. The link to the web-based questionnaire was shared with the potential respondents and only 187 of them responded to the questionnaire, which amounts to a 48.7% response

rate. It has been argued that a 30–40% response rate is appropriate for the web-based questionnaire [86, 87].

Collected data were analyzed with the use of IBM SPSS (version 23). Moreover, the research questions were analyzed using the descriptive statistics of frequency count and simple percentage, while the hypotheses were tested with the inferential statistics of ANOVA and multiple regression. The H1 and H2 are tested with ANOVA, while H3 is tested using multiple regression. Meanwhile, the items that answered questions on IOKS in SMEs were adapted from Tesavrita et al. [34]. The items adapted included discussion, training, internship, research collaboration and workshops. All of these items are designed to elicit the perception of SMEs owners about IOKS. All of these items pose questions about the opinion of SMEs owners in the KSA about discussing knowledge with other SMEs owners. Moreover, the study adopted Chong et al.'s [26] measure to ascertain the impact of ICT use in facilitating IOKS among SMEs. These items are to show how SMEs owners in the KSA have been using ICT to enhance inter-organizational sharing of knowledge. The items adapted included social media, extranet, e-mail and customer management systems. To ascertain the influence of ICT-enhanced IOKS on SMEs growth, items were adapted from Shepherd and Wiklund [61]. The items include sales, employees, profit, assets and equity.

## 5. Results

This section presents the results from the collection and analysis of the data. The data were analyzed using descriptive statistics (frequency count and simple percentage) and inferential statistics, as described in the methods section (ANOVA and multiple regression). *Tables 1–9* are used to display the results.

*Table 1* shows the demographic information from the responses of the respondents. This table shows that the construction industry has the highest representation of respondents (3.58%), while the least representation comes from IT services (11.2%). Meanwhile, manufacturing industry has 21.4%, the restaurant and food industry has

19.3% and retail service has 12.3%. This implies that the participants have more representation from organizations in the construction industry. *Table 1* shows that more than half (54.5%) of the respondents' organizations were between 5–10 years old, while a meager 10.7% were less than two years. It can be seen from *table 1* that more than half of the respondents' organizations had less than 50 employees, as 30.5% of them had between 1–5 employees and 47.6% had between 6–49 employees. Meanwhile, only 21.9% had between 50–249 employees. Moreover, a significant number of the respondents' organizations (65.8%) earned less than 3M, while 34.2% earned between 3–40M. Furthermore, it can be observed in *Table 1* that more than half of the respondents (63.1%) were chief executive officers in their organizations. This figure outweighed total representation with roles of director of human resources (9.6%), director of information technology (10.2%), director of accounting and finance (10.7%) and others (6.4%).

*Table 2* shows that only 6.4% used discussion as a technique to a very great extent, while 27.3% used it to a great extent, which amounted to 33.7% of the respondents using a discussion with other SMEs as a technique to enhance IOKS. This indicates that discussion with other SMEs was not used to a great extent or a very great extent. Moreover, 7.5% used training programs to enhance IOKS to a very great extent, 25.1% used it to a great extent, 24.6% used it to some extent, 29.9% used it to a little extent, and 12.8% used it to no extent. This implies that only 32.6% used training programs as a means of IOKS to a great and very great extent.

It can be seen in *Table 2* that 8.9% used the internship program to a very great extent, 27.3% used it to a great extent, 27.8% used it to some extent, 28.3% used it to a little extent, and 8.0% used it to no extent. This implies that more than half (54.1%) of the respondents did not use the internship program as a mechanism to partake in IOKS to a great or very great extent. *Table 2* further shows that parsimonious (3.7%) of the respondents used research collaboration with other SMEs to improve IOKS to a very great extent, 24.6% used it to a great extent, 25.1% used it to some extent, 31.0% used it



Table 1.

**Demographic information of respondents**

Items	Frequency	Percentage (%)
<b>Sector</b>		
IT services	21	11.2
Retail	23	12.3
Manufacturing	40	21.4
Restaurants and food	36	19.3
Construction	67	35.8
<b>Organization's age</b>		
Less than 2 years	20	10.7
2–5 years	65	34.8
5–10 years	102	54.5
<b>Number of employees</b>		
1–5	57	30.5
6–49	89	47.6
50–249	41	21.9
<b>Annual income of organization</b>		
Less than 3M	123	65.8
3–40M	64	34.2
<b>Respondents' role</b>		
Chief Executive Officer	118	63.1
Director of Human Resources	18	9.6
Director of Information Technology	19	10.2
Director of Accounting and Finance	20	10.7
Other	12	6.4

to a low extent, and 15.5% used it to no extent. This suggests that most of the respondents (71.6%) did not use research collaboration with other SMEs to enhance IOKS to either a great or very great extent. Similarly, over two-thirds (67.4%) of the respondents did not organize workshops to enhance IOKS to either a great or very great extent.

Table 3 shows that two-thirds (65.2%) of the respondents either disagreed or strongly disagreed that they adopt social media to share knowledge with other SMEs. Meanwhile, more (20.9%) respondents were neutral compared to those that either agreed or strongly agreed (13.9%) that they adopt social media to share knowledge with other SMEs. Table 3 shows that more

Table 2.

**IOKS practices among SMEs**

Items	VGE		GE		SE		LE		NE	
	F	%	F	%	F	%	F	%	F	%
Discussions with other SMEs	12	6.4	51	27.3	55	29.4	43	23.0	26	13.9
Training programs	14	7.5	47	25.1	46	24.6	56	29.9	24	12.8
Internship programs	16	8.6	51	27.3	52	27.8	53	28.3	15	8.0
Research collaboration	7	3.7	46	24.6	47	25.1	58	31.0	29	15.5
Workshops	9	4.8	52	27.8	59	31.6	40	21.4	27	14.4

Table 3.

**ICT systems/tools used by SMEs in IOKS**

Items	SA		A		N		D		SD	
	F	%	F	%	F	%	F	%	F	%
Social media	9	4.8	17	9.1	39	20.9	78	41.7	44	23.5
Extranet	12	6.4	61	32.6	49	26.2	32	17.1	33	17.6
E-mail	5	2.7	27	14.4	46	24.6	65	34.8	44	23.5
Customer management systems	4	2.1	20	10.7	58	31.0	69	36.9	36	19.3
Computer conferencing	68	36.4	88	47.1	8	4.3	21	11.2	2	1.1

than a quarter (39.0%) of the respondents agreed or strongly agreed that they use extranet in IOKS with other SMEs, while a quarter was neutral on whether they used extranet in IOKS with other SMEs. The Table 3 also shows that more than half (58.3%) of the respondents disagreed or strongly disagreed that they used e-mail in IOKS with SMEs. It is noteworthy that about a quarter (24.6%) of the respondents were neutral and only about 17.1% either agreed or strongly agreed.

In Table 3, greater than half (56.2%) of the respondents disagreed or strongly disagreed that they used customer management systems to share knowledge with other SMEs. Also, it is significant to note in the table that 31.0% were neutral, while 12.8% either agreed or strongly agreed. This suggests that the customer

management system is not a popular system/tool used in IOKS among SMEs. Moreover, Table 3 demonstrates that the majority (83.5%) of the respondents agreed that computer conferencing is used as a tool for inter-organizational conferencing in IOKS with SMEs. This suggests that most organizations used computer conferencing as an IOKS system/tool. As seen in the Table 3, only a scanty 4.3% were neutral and 12.3% either disagreed or strongly disagreed.

Table 4 shows that the majority (79.7%) of the respondents believed that IOKS improved sales to a great or very great extent. It also demonstrates that 3.7% viewed IOKS as improving sales only to some extent, 16.0% believed it is improved to a little extent, while a meager 0.5% believed it is improved to no extent. Also,

Table 4 shows that most (75.9%) of the respondents agreed that IOKS enhanced employee productivity. Meanwhile, some 13.9% were of the position that IOKS improved employee productivity to some extent, 9.6% believed it is to a low extent and 0.5% agreed that it was to no extent. Similarly, it was observed that 77.5% responded that IOKS increased profit, 11.2% believed it is to some extent, 9.6% believed it is to a low extent, and 1.6% believed it is to no extent.

Furthermore, Table 4 indicates that most (69.5%) of the respondents answered that IOKS increased the asset value of an organization; 23.5% believed that it is to some extent, 5.3% answered that it is to a low extent, while 1.6% agreed that it is to no extent. Table 4 shows that a significant majority (84.0%) of the respondents believe that inter-organizational knowledge improves an organization’s equity. It can also be seen in the Table 4

that 15.5% answered that IOKS improved equity to some extent, while only 0.5% agreed that it is to no extent. It is noteworthy that none of the respondents answered that IOKS improved equity to a low extent.

Table 5 shows that the degree of freedom is 186. The R-value is 0.598, which indicates that there is a positive but linear relationship between the extent of ICT use and IOKS. This means that the sample lies on a positive slope. Also, the r-square is 0.357, showing that there is a 35.7% variation in the response variables and explaining the relationship between the extent of ICT use and IOKS. The f-statistic is 102.98 for the testing of the hypothesis. Meanwhile, the p-value is 0.000, which is less than the 0.05 level of significance. Thus, the alternate hypothesis will be accepted. This means that the extent of ICT use has a statistically significant, positive effect on IOKS.

Table 4.

**SMEs growth indicators**

Items	VGE		GE		SE		LE		NE	
	F	%	F	%	F	%	F	%	F	%
Improvement of sales	66	35.3	83	44.4	7	3.7	30	16.0	1	0.5
Employee productivity	90	48.1	52	27.8	26	13.9	18	9.6	1	0.5
Profit increase	70	37.4	75	40.1	21	11.2	18	9.6	3	1.6
Asset increase	66	35.3	64	34.2	44	23.5	10	5.3	3	1.6
Improved equity	123	65.8	34	18.2	29	15.5	0	0.0	1	0.5

Table 5.

**The relationship between ICT use and IOKS**

	Sum of Squares	Mean Square	Std. Error	Df	R	R <sup>2</sup>	Adj. R <sup>2</sup>	F-stat	Sig.
IOKS	1175.319	1175.319	1.117	186	0.598	0.357	0.354	102.918	0.000
ICT use	2112.692	11.420	0.077						
<b>Total</b>	<b>3288.011</b>								

Predictors: (Constant), ICT Use  
 Dependent Variable: IOKS

Table 6.

**The relationship between IOKS and SMEs growth**

	Sum of Squares	Mean Square	Std. Error	Df	r	R <sup>2</sup>	Adj. R <sup>2</sup>	F-stat	Sig.
IOKS	0.145	1175.319	1.117	186	-0.009	0.000	-0.005	0.014	0.906
SMEs growth	1899.321	11.420	0.077						
<b>Total</b>	<b>1899.465</b>								

Predictors: (Constant), IOKS  
 Dependent Variable: SMEs Growth

The hypothesis on IOKS has a statistically significant, positive effect on SMEs growth, as shown in *Table 6*, indicating that the degree of freedom is 186. The R-value is -0.009 can also be seen in the *Table 6*, indicating that there is a negative linear association between IOKS and SMEs growth. This indicates that the sample lies on a negative slope. The *r*-square is 0.000, which shows that there is a 0.00% variation in the response variables, elucidating the association between the two variables. It is also shown that the *f*-statistic is 0.014. The *p*-value is 0.906, which is higher than the significance level of 0.05. Therefore, the alternate hypothesis will be dismissed. Thus, IOKS has a statistically significant, negative effect on SMEs growth.

*Table 7* shows that there is a correlation of 0.386 between SMEs' growth (dependent variable) and the model. This shows a positive but weak relationship between the dependent and independent variables (social media, extranet, e-mail, customer management

systems, and computer conferencing). Meanwhile, SMEs' growth accounts for 0.149 of the total variation. This indicates that the independent variables only account for 14.9% of SMEs' growth. Also, the goodness-of-fit for the model is 0.125, which implies that the model is not good.

*Table 8* shows that the Regression Sum of Squares is 282.8 while the Total Sum of Squares is 1899.4, which indicates that the regression model explains only 282/1899 (about 15%) of the variability in the dataset. The *f*-statistic is 6.332 and the *p*-value is 0.000, which indicates that the model fits the data better than a model without predictor variables. This suggests that the independent variables in the model improve the fit of the model. Since the *p*-value (0.000) is lower than the significance level of 0.05, the alternate hypothesis is hereby accepted. This means that ICT tools/systems are statistically significant predictors of SMEs' growth.

Table 7.

**The relationship between ICT tools and SMEs' growth – Model summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.386	0.149	0.125	2.989	0.149	6.332	5	181	0.000

Predictors: (Constant), social media, extranet, e-mail, CMS, conferencing

Table 8.

**ANOVA**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	282.803	5	56.561	6.332	0.000
	Residual	1616.662	181	8.932		
	Total	1899.465	186			

Predictors: (Constant), social media, extranet, e-mail, CMS, conferencing  
 Dependent Variable: SMEs' Growth

Table 9.

**Coefficients**

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.593	1.165		13.385	0.000
	Social media	0.150	0.222	0.050	0.674	0.501
	Extranet	-0.348	0.208	-0.132	-1.673	0.096
	E-mail	-0.041	0.235	-0.014	-0.173	0.862
	CMS	0.419	0.260	0.129	1.611	0.109
	Conferencing	1.171	0.225	0.358	5.205	0.000

Dependent Variable: SMEs' Growth

This, however, may be low as explained by the variability of the dataset.

Table 9 shows that an increase in the use of computer conferencing (t = 1.171) for IOKS would increase SMEs' growth. Also, an increase in the use of customer management systems (t = 0.419) for IOKS would increase SMEs' growth. Similarly, an increase in the use of social media (t = 0.150) for IOKS would increase SMEs' growth. Unlike computer conferencing, social media, and customer management systems, both extranet and e-mail show negative coefficients. This means that an increase in the use of extranet (t = -0.438) for IOKS would lead to a decrease in SMEs' growth. Lastly, an increase in the use of e-mail (t = -0.041) for IOKS would lead to a decrease in SMEs' growth. In conclusion, the use of computer

conferencing in IOKS is the highest predictor of SMEs' growth while the use of an extranet in IOKS would lead to the highest decrease in SMEs' growth.

**6. Discussion**

The study focuses on the impact of ICT on IOKS for SMEs growth. The conceptual model of the study shows the inter-relationships among ICT use, IOKS and SMEs growth. Findings showed that IOKS among SMEs is carried out only to some extent. It is largely unpopular among the different SMEs that were sampled in this study. It was revealed that not even half of the organizations used discussions with other SMEs, training programs, internship programs, research



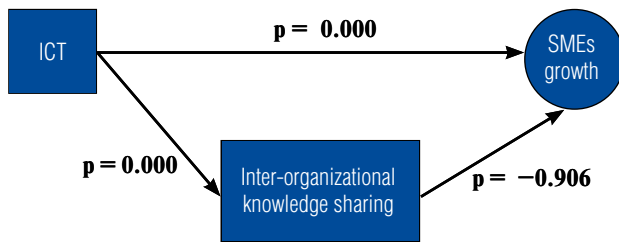


Fig. 2. Research framework showing the results of tested hypotheses.

collaboration and workshops. The finding of this study is different from that of Tesavrita et al. [34], which showed that training, research, internship and discussion are all avenues for IOKS. While it is accepted that IOKS is relatively recent [33], evidence provided in this study shows that it has not been adopted to a great extent among SMEs. The result of the study reinforces the findings of Chong et al. [26] that IOKS among SMEs in Malaysia is unpopular and difficult to implement. Al-Jabri and Al-Busaidi [25], however, showed that some factors that determine this challenge include the nature of knowledge, senders' and recipients' characteristics, and inter-organizational dynamics.

The findings of this study showed that social media are not popular as a medium for IOKS among SMEs. Results showed that more of the respondents were neutral compared to those that agreed they used social media for IOKS. Tesavrita et al. [34] revealed that IOKS could be offline and online. This suggests why social media may not be popular and why there may be more offline mediums of IOKS. This is supported by findings from the literature that social media are an avenue for IOKS [26, 48, 49]. Also, the results of the study showed that extranet, e-mail, customer management systems and computer conferencing were among the least used for IOKS among SMEs. This differs from the findings of Al-Busaidi and Olfman [5] that the business sector used ICT tools for IOKS organizations. Castaneda and Toulson [52] revealed that video conferencing can facilitate IOKS, while e-mail does not enhance IOKS.

Results of this study showed that ICT-enabled IOKS improves sales and enhances employee productivity to a great extent. Shepherd and Wiklund [61] had this same finding. The findings also showed that IOKS increased profit to a great extent. The study results showed that IOKS increases organizational asset value to a great extent. It was also shown by Mohsam and Van Brakel [55] that IOKS among SMEs will enhance competitive advantage. The study findings revealed that the IOKS improves organizational equity to a great extent. Chong et al. [26] revealed that the influence of ICT on IOKS among business owners is unclear.

Furthermore, Cresswell et al. [56] showed that IOKS enhances organizational growth, which supports the findings of this study. Similarly, other studies [2, 57] found that IOKS not only improves learning among employees but enhances the growth of SMEs. It was found that the extent of ICT use has a statistically positive significant effect on IOKS. Also, IOKS has a statistically significant, negative effect on SMEs growth. This is dissimilar to the findings of Alashwal et al. [59] that there is a statistically significant, positive relationship between inter-organizational sharing and SMEs performance in the construction industry in Malaysia. Meanwhile, the greatest representation (35.8%) of the sampled respondents was from the construction industry.

The findings of this study showed that ICT tools are statistically significant predictors of SMEs' growth. However, the findings showed that the correlation between the model and SMEs' growth is positive but weak ( $r = 0.386$ ). Results indicate that the independent variables improve the fit of the model, but the model explains only 15% of the variability in the dataset. The test of the hypothesis further shows that the model is not of good fit, suggesting that the model is not good. However, it was established that the model is better than a model without predictors of SMEs' growth. This suggests that the predictors improve the fit of the model, albeit minimally. Results illustrate that out of the five predictors, only computer conferencing, customer management systems and social media positively predict SMEs' growth. This buttresses previous studies' [26, 48, 49] findings that social media, customer management

systems and computer conferencing have a significant effect on the performance of SMEs. Meanwhile, both extranet and e-mail are negative predictors of SMEs' growth. This has mixed findings with Castaneda and Toulson [52] that showed that video conferencing has a significant impact on the adoption of ICT among SMEs, but e-mail does not have a significant impact.

### 7. Conclusion and implications

This study examined the impact of ICT on IOKS for SMEs growth. It was established in the study that IOKS among SMEs takes place to some extent and that SMEs do not use avenues such as training programs, internship programs, research collaboration and workshops to share knowledge. The study also concluded that the use of ICT tools such as social media, extranet, e-mail, customer management systems and computer conferencing was not common for IOKS among SMEs. The study established that ICT-enabled, IOKS enhances sales, productivity, profit, organizational asset value and equity to a great extent. The first alternate hypothesis tested was accepted, as it was concluded that ICT use has a statistically significant, positive impact on IOKS. The second alternate hypothesis was rejected, and it was thus established that IOKS has a statistically significant, negative effect on SMEs growth. The third alternate hypothesis is accepted, which shows that ICT tools-enabled IOKS are statistically significant predictors of SMEs' growth. Moreover, it was shown that using social media, computer conferencing and customer management systems for IOKS would

improve SMEs' growth. However, the use of e-mail and extranet in IOKS would lead to a decrease in SMEs' growth. Based on the study's conclusions, the following recommendations were proffered:

1. SMEs should ensure they use the avenue of training programs, internship programs, research collaboration and workshops to share knowledge among themselves.
2. There should be an increase in the use of ICT tools/systems to enhance IOKS among SMEs.
3. Future studies may consider examining the same research area using a qualitative research approach to have a detailed understanding of how IOKS enhances SMEs' growth.

The theoretical implication of the findings is that ICT can be used to facilitate IOKS among SMEs. Moreover, ICT tools enhanced IOKS and SMEs' growth. It has been further established that IOKS among SMEs has a statistically negative effect on SMEs growth. This means that theoretical models should consider that ICT has a significant effect on IOKS among SMEs. In practice, the study showed that SMEs owners and employees should endeavor to leverage the opportunity of sharing knowledge with other SMEs using avenues such as training programs, internship programs, research collaboration and workshops. Based on the findings, it is suggested that SMEs owners should consider using social media, computer conferencing and customer management systems in order to enhance their business expansion and growth. The findings of the study also added to the theory that the use of ICT tools/systems enhances IOKS among SMEs. Moreover, the Ministry of Commerce (KSA) should endeavor to provide enabling policies to enhance ICT-enabled IOKS among SMEs. ■

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