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## **Knowledge Sources and IT Applications among SMEs: An Empirical Investigation in Saudi Arabia**

Naief Azyabi

*Jazan University, ngazyabi@gmail.com*

Julie Fisher

*Monash University, Julie.Fisher@monash.edu*

Kerry Tanner

*Monash University, Caulfield School of IT, Kerry.Tanner@monash.edu*

Shijia Gao

*Monash University, Caddie.Gao@monash.edu*

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## Knowledge Sources and IT Applications among SMEs: An Empirical Investigation in Saudi Arabia

Azyabi, Naief

Email: [nazyabi@jazanu.edu.sa](mailto:nazyabi@jazanu.edu.sa)

Jazan University

Fisher, Julie

Email: [julie.fisher@monash.edu](mailto:julie.fisher@monash.edu)

Tanner, Kerry

Email: [Kerry.tanner@monash.edu](mailto:Kerry.tanner@monash.edu)

Gao, Shijia

Email: [caddie.gao@monash.edu](mailto:caddie.gao@monash.edu)

Monash University

### ABSTRACT

*The differences between large organizations and small and medium-sized enterprises (SMEs), in terms of their characteristics and challenges, may result in different practices toward many dimensions such as managing knowledge resources. Most KM research has been conducted in large organizations and in a western context. SMEs in developing countries such as Saudi Arabia have different situations and circumstances that need further investigation. The research empirically investigated, the sources from which Saudi Arabian SMEs acquire their knowledge to operate and compete, and explored the extent to which information technology (IT) applications are used for the purpose of knowledge acquisition. Data based on surveying 143 SMEs and interviewing 17 SME managers, shows that both internal and external knowledge sources are important to SMEs with differences in terms of the variety of external sources and the limitations of internal sources. Among the external sources, customers and suppliers are the most significant knowledge sources for SMEs, while employees are the main internal knowledge source that SMEs rely on. The use of IT for such purposes is quite limited among SMEs except Internet and email which are intensively used by many SMEs.*

**Keywords:** Knowledge source, External knowledge, Internal knowledge, IT, SMEs.

### 1. INTRODUCTION

According to the knowledge-based view, an organization's success and sustainability depend on its prioritizing knowledge as a strategic resource (Grant, 1996). Managing knowledge resources is found positively related to organizational efficiency and effectiveness (Jennex & Olfman, 2002). SMEs, in particular, need to consider knowledge given it is a scarce resource. Most knowledge management (KM) research has been undertaken in the context of large organizations. SMEs are different to large organizations in many ways such as their environmental and organizational structure, their decision making processes and their information systems investments and capabilities (Blili & Raymond, 1993). SMEs, furthermore, face different challenges such as global competition, more prone to economic downturns and rapidly changing customer demands (Bhagwat & Sharma, 2006). It is recognised that the differences in organizational internal and external environments and structure make the replication of management theories pertaining to large organizations difficult in the SME context (Schubert, Fisher, & Leimstoll, 2007). McAdam and McCreedy (1999) compared KM processes in large organizations and SMEs finding that SMEs' practices were different to large organizations in terms of all knowledge processes (i.e. knowledge construction, embedding, dissemination and use). To operate and compete, SMEs usually rely on some key employees with the knowledge that can differentiate their organization from their competitors. In highly competitive markets, the risk is losing such crucial knowledge if these employees leave (Desouza & Awazu, 2006).

Despite the significance of knowledge for SMEs' competitiveness and sustainability, as with other resources, SMEs also suffer from limited knowledge (Caloghirou, Kastelli, & Tsakanikas, 2004). However, limited empirical work has been done on how SMEs acquire their required knowledge for their operations and to what extent they exploit information technology (IT) applications for this purpose. Moreover, research on Saudi Arabian SMEs is very limited, particularly in the KM area. The majority of KM research emanates from Western developed countries and some Asian countries. No previous research has examined SMEs in Saudi Arabia in terms of their KM practices; thus this paper contributes to fill this gap through an empirical investigation of one aspect of KM in the Saudi SME context—the sources that SMEs acquire their knowledge from and how IT applications are utilized for such acquisition. The paper, furthermore, identifies drivers, motivations and barriers that influence Saudi SMEs' decisions about knowledge sources and IT use.

## **2. LITERATURE BACKGROUND**

### **2.1. Knowledge Sources**

Interactions between organizations and external environment entities such as customers, suppliers and competitors or interactions between the internal organizational entities are considered as the primary means for creating knowledge (Caloghirou et al., 2004). Thus, the location in which knowledge exists is quite significant. Knowledge location can determine the level of difficulty associated with obtaining/ accessing the knowledge and the extent to which such knowledge is applicable for a particular organizational context. Different knowledge sources have different implications for an organization's operations and could require different knowledge acquisition capabilities and strategies. Literature on KM and KM strategy shows that the sources from which organizations obtain knowledge was used as a dimension based on which KM strategy can be identified (Bierly & Chakrabarti, 1996; Choi, Poon, & Davis, 2008; Von Krogh, Nonaka, & Aben, 2001; Zack, 1999a).

Knowledge source in this research is defined as the sources from which organizations obtain their knowledge, in line with Zack's (1999b) definition. These sources can be classified generally into internal and external sources. Internal knowledge is the knowledge that was initially created and distributed inside an organization's boundaries (Bierly & Chakrabarti, 1996); this includes an organization's research and development (Uhlener et al., 2007), knowledge contained in employees' minds, or knowledge of an organization's behaviours, procedures, software or databases (Zack, 1999b). On the other hand, external knowledge is the knowledge that is imported from outside sources. This knowledge can be acquired through several ways: imitation or acquisition (Bierly & Chakrabarti, 1996), through hiring new employees or conducting customer surveys (Holsapple & Joshi, 2004), strategic alliances, and attending presentations or seminars (Beijerse, 2000). External knowledge might also be obtained from government agencies, academic institutes, consultants, publications, software and hardware vendors and other organizations (Zack, 1999b). Obtaining external knowledge is often hindered by many legal and technological barriers—especially knowledge of competitors. External knowledge is often costly, exposed to competitors and may not suit an organization's context, but may be necessary for the creation of new ideas (Zack, 1999b). It cannot be deeply examined unless it has been brought in and applied (Menon & Pfeffer, 2003).

The literature, primarily focused on large organizations, highlights the significance of both external and internal knowledge for organizations to operate and compete. However, in the case of SMEs, the limited resources they suffer from could lead to different decisions and practices toward both internal and external sources.

### **2.2. SMEs and Knowledge Sources**

Despite large organizations being the major focus of KM research, some work has involved SMEs. Research found that even though SMEs have no formal or explicit KM plan (Beijerse, 2000), they practise KM but do not recognize it as such (Skyrme, 2002). Among the critical success factors for KM senior management support and commitment was found to be the most significant for SMEs (Wong & Aspinwall, 2005). Beijerse (2000) investigated the influences of an organization's KM strategy and organizational structure and culture on KM in SMEs. He found that even though SMEs practise KM, they lack a supportive strategy, structure and culture.

In terms of SMEs' practices toward knowledge sources, Uhlener et al. (2007) found that KM acquisition strategies (from external sources) was the most significant factor positively influencing SMEs' performance and innovation. Furthermore, they found that the SMEs that share and exchange their knowledge with external entities have higher growth and turnover than those who do not and SMEs usually acquire knowledge from external sources, such as suppliers, competitors, colleagues and customers more than utilizing their internal sources. Desouza and Awazu (2006) supported these claims by stating that SMEs, more than large organizations, have a higher need and desire to exploit external knowledge. However, it can be argued that the high focus on day-to-day operations could negatively affect the SMEs' ability to explore the external knowledge and integrate it with their internal resources.

The review of KM literature and SMEs highlights the lack of research relating to identifying the sources from which SMEs obtain and acquire their knowledge. SMEs often lack the capabilities to develop new knowledge or to effectively integrate new knowledge with their existing knowledge. In such situations, the decision on the most appropriate knowledge sources to rely on has to be taken into consideration. This research explored Saudi SMEs' practice towards both internal and external knowledge sources, and the factors that influence such practices.

### **2.3. IT and Knowledge Sources**

There are many benefits for SMEs in using IT applications such as: improving their competitive capabilities, providing faster delivery, quick responses, lowering cost, better customer service, better decision making; and helping SMEs to implement strategy through providing greater organizational efficiency (Bhagwat & Sharma, 2006). It is recognized that not all KM initiatives are IT-based; however, IT plays a significant role in supporting KM in many different ways. IT support for KM refers to the extent of the availability of IT applications through which KM

activities and processes can be performed and/ or facilitated (Pee & Kankanhalli, 2008). Regarding the relationship between IT and knowledge sources, the literature suggests a wide range of support that IT can provide. To support internal knowledge utilization, IT can assist through: coding, sharing and transferring best practices in organizations; enabling conversations and creating organizational knowledge directories and databases. With respect to external knowledge acquisition, IT can help in creating knowledge networks and facilitating the communication and cooperation with external entities (Alavi & Leidner, 2001; Lee & Choi, 2003).

IT in KM initiatives were classified by Carrillo, Anumba, and Kamara (2000) into four categories: (1) knowledge creation systems; (2) knowledge processing systems; (3) knowledge sharing systems; and (4) knowledge capture and codification systems. This classification however described KM systems without considering knowledge sources and did not consider the implications of this on the type of IT applications that organizations need to adopt. Gold, Malhotra, and Segars (2001) argue that organizations need to manage different IT applications and functions strategically to overcome the inhibition of information flow between different parts and units. Such management could require comprehensive IT-based systems such as business intelligence, collaboration and knowledge discovery systems which help organizations create knowledge on the external and internal environment.

However, this view is less applicable for SMEs due to their inability to adopt, invest and manage a combination of sophisticated systems. SMEs often are unable to invest in expensive KM systems because they do not have enough resources and they use the basic systems such as email, intranet and database management systems. According to the study by Chan and Chao (2008), more than 70% of SMEs do not have investments in KM technical support.

### 3. RESEARCH DESIGN

The research for this paper was conducted among Saudi Arabian SMEs. The number of employees was the parameter used in defining an SME and organisations with less than 100 employees were selected. Data were collected in two phases: a survey and semi-structured interviews. The survey instrument was in three parts: demographic information, knowledge sources and IT applications. The items on knowledge sources were extracted from previous research investigating the same dimensions (Choi et al., 2008; Lee, Chang, & Choi, 1999). Seven items (four for external knowledge and three for internal knowledge) were used. The participants were asked to indicate their level of agreement on a 5-point Likert scale where 1 was “strongly disagree” to 5 “strongly agree”.

For IT applications, the level of use of 14 IT applications (extracted from (Alavi & Leidner, 2001; Carrillo et al., 2000; Choi & Lee, 2002; Hansen, Nohria, & Tierney, 1999) was measured in the questionnaire on a 5-point scale where 1 was “unknown application”, to “5 “intensively used”. Moreover, the participants were given the opportunity to nominate any other applications they use which were not listed.

To ensure the accuracy and applicability of the survey instrument and to avoid any misunderstanding, a validation process was undertaken. This involved four Saudi Arabian academics and practitioners who had related experience, in terms of their jobs, teaching and research, about Saudis SMEs. Three were researchers in a well-known university in Saudi Arabia and had undertaken previous research on SMEs. The fourth participant was the head of a SME development centre in one of the biggest Chambers of Commerce in Saudi Arabia. The aim of this process was to evaluate the instrument based on three factors: the appropriateness of the items for the Saudis SMEs; the ease and simplicity of language used (not very technical terminology); and the accuracy of the Arabic translation of the items.

The comments and suggested changes by those experts were reviewed and incorporated where applicable. Due to the absence of any official or governmental agency of SMEs, there was no official directory for Saudi Arabian SMEs. Thus, we could not obtain any contact details to communicate with the targeted SMEs. We relied on the Internet to find contact details for SMEs; these were scattered across many websites and business discussion forums. The contact details, which were found on these websites, were mainly emails and websites; very few had postal addresses. Thus an online survey technique was used for the first stage of data collection. Due to these practical difficulties, the sampling cannot be considered as a random sampling approach. We acknowledge that the data was subjected to sampling error. However, by employing the two main components of normality: skewness and kurtosis, the data met the assumption of normality. There were 143 SMEs that participated in the survey stage. The demographic data of these participants is summarized in Table 1.

Table 1: Characteristics of Participants

Job title	%	Industry sector	%	Organization age	%	No. of employees	%
Owner/manager	69.0%	ICT	18.0%	< 1 year	8.0%	<20	44.0%
IT manager	12.0%	Manufacturing	12.0%	1-5 years	38.0%	21-60	32.0%
Finance manager	14.0%	Service	35.0%	6-10 years	25.0%	61-100	24.0%
Others	5.0%	Construction	16.0%	> 10 years	29.0%		
		Other	19.0%				

The participants represented a wide spectrum of different SMEs in terms of their characteristics. More than five main industry sectors (information and communication technology, manufacturing, service, construction and others) were represented as well. The participating SMEs were also of different sizes (small and medium), different ages (less than one year, between one and five years, between six and ten years and more than ten years).

There was a question in the survey asking participants if they were prepared to be interviewed. Thirty five indicated their willingness to participate in the interview phase and provided their email details for further communication. Invitation emails were sent to all, but only 17 replied and were contacted and interviewed. One participant was interviewed from each organisation. The participants' roles were: 15 managers, one marketing manager and one vice president. These SMEs were from a wide range of industry sectors (construction, ICT, retail, manufacturing and services). The findings of these interviews were analysed, compared and linked to the survey findings to have a more holistic understanding of the research phenomena.

#### 4. FINDINGS AND DISCUSSION

The findings of both the survey and interviews are discussed below. Firstly, knowledge sources are discussed in terms of quantitative findings and followed by qualitative explanations. Then, the findings on IT use are presented from both quantitative and qualitative perspectives.

##### 4.1 Quantitative Findings on Knowledge Sources

Participants' orientation towards external knowledge and internal knowledge were measured on four items and three items respectively. Generally, they showed high level of agreement with all the statements as portrayed in Table 2 below.

Table 2: Participants' Responses to Knowledge Sources Statements

Knowledge Sources items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Std. Dev.
A large portion of our new knowledge has been developed on the basis of customers' and/or suppliers' knowledge	2%	17%	15%	52%	14%	3.59	.995
A large portion of our new knowledge has been developed through analysis of competitors' knowledge	1.40%	13.9%	21.6%	53.8%	9.0%	3.55	.893
In terms of developing new knowledge, we prefer external consulting companies' knowledge over internal departments' knowledge	4.20%	25.8%	24.4%	34.2%	11.1%	3.22	1.084
A large portion of our new knowledge has been developed through collaboration and alliance with external institutions or organizations	2.8%	20.9%	18.8%	38.4%	18.8%	3.50	1.106
Overall External Knowledge						3.47	.808
Internal knowledge is an important source for creating new knowledge in our company	0.7%	4.9%	23.7%	58.0%	12.5%	3.77	.757
We use our internal knowledge frequently to develop new knowledge	2.1%	4.2%	23.0%	56.6%	13.9%	3.76	.822
The quantity and quality of our internal knowledge are/is superior to those of competitors	1.4%	18.8%	36.3%	35.6%	7.6%	3.29	.910
Overall Internal Knowledge						3.61	.677

The findings, as presented in Table 2, show that SMEs rely on some external knowledge such as customers and suppliers (mean = 3.59), competitors' knowledge (mean = 3.55) and alliance with external institutions or organizations (mean=3.50) more than their reliance on consulting agencies (mean= 3.22). It can be seen that more than 50% of the participants either disagreed or were neutral in regards to their reliance on consulting organizations. In terms of internal knowledge, there was strong agreement on the importance (mean= 3.77) and usefulness (mean=

3.76) of their internal knowledge, but there was a lower level of agreement on the superiority of their knowledge in comparison to their competitors (mean= 3.29). The mean of external knowledge sources (3.47) is less than the mean of internal knowledge sources (3.61), however, in a paired samples T-test this difference was not significant (sig = .113).

## 4.2 Qualitative Findings on Knowledge Sources

Even though the quantitative data shows that both internal and external knowledge are widely used by SMEs, the qualitative data shows that some SMEs rely more on external knowledge than internal knowledge.

### 4.2.1 External knowledge :

External knowledge sources vary in the context of the participating SMEs. The finding that there are a wide range of external sources from which SMEs get knowledge and advice was also reported by Ramsden and Bennett (2005) who found that SMEs rely intensively on external advice. Four main external sources were found most used and relied upon by SMEs to obtain the required knowledge: customers and suppliers, alliances with other businesses, the Internet and consultants. The most common type of knowledge that SMEs were looking for is how to reduce their costs.

The most common knowledge sources for Saudi SMEs are customers and/or suppliers. They represent one important source of information and knowledge for SMEs in many dimensions such as suggesting new ideas, evaluating services, providing technical knowledge and sometimes transferring knowledge of competitors to SMEs. If the customer is a large organization, then SMEs sometimes can adopt their procedures, techniques and technologies. SMEs whose customers are large organizations have been found to be more aware of the benefits of KM such as documenting their processes, experience and knowledge. SMEs can obtain knowledge from their suppliers either directly through communicating with them or indirectly through monitoring their decisions and behaviours that can reflect certain knowledge. A manager of an SME working in steel distribution said:

*Sources for such information either Internet or you can predict it from the large suppliers' behaviours (reducing prices to sell more, or supply less because the prices will increase in the near future).*

Competition among suppliers can work to the benefit of SMEs because suppliers are keen to build relationships with SMEs. Thus, suppliers provide information, knowledge, and sometimes financial support such as offers and discounts for SMEs. Suppliers intend to satisfy their SME customers by offering these services. These findings on the importance of customers'/suppliers' knowledge are in line with what was found by Bennett and Robson (1999) among British SMEs. They found that customers and suppliers were ranked as the second most used source for advice on their business.

Alliances are different in many aspects. Most alliances are undertaken between an SME and their competitors to perform one project through a contract. They build relationships with some friends of other SMEs to exchange knowledge and information. This interaction with the competitors, is considered, as mentioned by Cegarra-Navarro (2005), an ideal way to improve organizational knowledge because the interaction between the employees from different organizations will allow knowledge absorption. Some SMEs have built or are trying to be engaged in alliances with large international or local organizations. They believe that such alliances will help them to obtain the required knowledge to compete and be successful in their market. Customers of these SMEs are usually large organizations, thus they want to be qualified enough to satisfy their customers. Some of these SMEs established such alliances even before they started their business. A manager of an SME working in industrial maintenance said:

*It was essential for us to find [an] international experienced strategic partner before we started because the business we were intending to enter is very complicated and requires a high level of knowledge and advanced technologies.*

The Internet is a significant source for many SMEs to gain information to run their business or to make important decisions. It is used by some SMEs to find new opportunities, either new areas/projects to enter or new suppliers to have better service and /or less cost. The Internet is used intensively by SMEs because of its ease of use, low cost and anytime-anywhere accessibility. The manager of a café shop said:

*It is the main tool for information because it is easy to use, available at any time and very cheap.*

Consultants were found to be one of the external knowledge sources used, but only by a few SMEs either before they start or when they face difficulties in their business. Many SMEs cannot afford consultation costs due to their limited resources, thus they may seek advice through their friendly relationships with some experts. This could explain why survey participants indicated that they rely less on consulting organizations compared to other sources. This reason was clearly mentioned by one of the participants working in industrial maintenance:

*Some consultations are very expensive and we cannot afford them.*

#### 4.2.2 Internal Knowledge:

It seems that there is only one main internal source which is employees. The participating SMEs, mostly, were not building any knowledge base utilizing appropriate IT applications. Although SMEs depend a lot on external knowledge and information sources, they highly consider their employees as the main factor of their success and sustainability. They can convert the obtained knowledge into something tangible. The employees' knowledge has evolved through practice over time and that makes it unique and fitting the business. This knowledge consists of past knowledge in other organizations, the knowledge that was obtained in their current SMEs or a combination of both. There were a few organizations that developed databases which contain customers' details for marketing purposes; however this cannot be considered as common practice among SMEs.

It should be noted that external and internal knowledge are not mutually exclusive. In other words, SMEs can rely, highly, on both types of knowledge. Even though SMEs acquire and utilize the knowledge from external sources, employees' knowledge and experience are essential to succeed in such acquisition and utilization. Thus, internal knowledge cannot be discussed or investigated in contrast to external knowledge, but the extent to which SMEs obtain knowledge from external sources should be considered. There is no external knowledge utilization or use without internal knowledge involvement. Based on this, any external knowledge utilization or acquisition can be considered internal knowledge utilization and exploitation.

### 4.3 Quantitative Findings on IT Applications

The level of IT use was measured by asking the participants to provide their level of use of fourteen IT applications on a 5-point scale where 1 referred to "unknown application", 2 to "known but not used", 3 to "rarely used", 4 to "regularly used" and 5 to "intensively used". The overall summary of the answers of the participating SMEs is presented in Table 3 below.

Table 3: The Level of Use of IT Applications

IT Application	Mean	Std. Dev.	IT Application	Mean	Std. Dev.
Internet	4.40	0.936	Decisions support systems	2.78	1.147
Emails	4.35	0.898	Groupware systems	2.76	1.239
Search engines	3.99	1.028	Workflow systems	2.76	1.188
Intranet	3.84	1.298	Discussion forums	2.76	0.973
Database management systems	3.37	1.105	Video conferencing	2.59	0.867
Document management systems	2.98	1.129	Business intelligence systems	2.22	1.176
Instant messaging	2.88	1.104	Information portals	1.76	0.724

It can be observed from Table 3 that the Internet and email were intensively used based on the mean (4.40 and 4.35 respectively). Search engines and intranets (Internet applications) were ranked as the most regularly used applications (means= 3.99 and 3.84 respectively), followed by database management systems (mean = 3.37). The rest of the IT applications were found to be rarely used with exception of information portals, which were classified as "not used" (mean = 1.76). The following section presents the qualitative findings on the IT applications in SMEs.

### 4.4 Qualitative Findings on IT Applications

Face-to-face interviews confirmed that the Internet and email were the most used applications among SMEs for the purpose of obtaining or exchanging knowledge. Internet use included searching a wide range of websites, building their own website or utilizing social networks sites. To understand why the Internet-based applications were the most used applications in the Saudi context, it is important to note that the number of Internet users increased in Saudi Arabia to 49% of the whole population in recent years (Internet World Stats, 2012). This boom in Internet use may explain why SMEs tended to use Internet-based applications either to discover new knowledge/opportunities (new projects, new suppliers/customers and new ways or techniques) or to communicate with the external environment. This was mentioned by the manager of a SME in the construction and contracting sector.

*The Internet is very important for our business from which we know the new opportunities and projects. We use the Internet to find out the suppliers for some parts and materials to be used in our projects*

The second most used application was email which was used by all the participating SMEs. Communication, internally and externally, is the main purpose for using email. Communication in this context means exchanging



information, files, documents, etc. The ease of use and low cost of email applications and tools are the main factors behind Internet and email use. However, some SMEs may not intend to use email to obtain external knowledge (such as customers/suppliers) but they are communicating and discussing with them; thus they learn and may gain knowledge and experience from such interactions. Email, further, is used internally in many SMEs to exchange documents and information. This information is either used to perform daily operations or to make decisions.

*In terms of communications with our customers and the external environment, email is the main means of communication because it is cheap, easy to use and can be used as a document in the future.*

Utilizing social networks by SMEs is still very limited. Marketing and communicating with customers are the main purposes for those SMEs who adopt social networks, particularly Facebook and Twitter. It is rare among SMEs to collect, analyse and take into consideration customers' feedback from these social networking websites because of a lack of staff.

*We use some social network websites, mainly Facebook and twitter, to communicate with customers. We have a group, Public Relations, to manage and supervise both social networks and our website communications.*

Database management systems were also adopted by some SMEs. The main purpose of such systems is to ease the communication with customers/suppliers and to facilitate resources management and control. Some SMEs are keen to have their processes documented, thus they want to adopt such systems. It is worth mentioning that only a few SMEs had adopted such systems and they believed by having such systems, that their efficiency and decision making process can be improved by having accurate and up-to-date information when it is required. Very few SMEs adopt ERP systems, and these organizations have different circumstances such as having large organizations as their customers.

#### 4.5 Relationships between IT and Knowledge Sources

To investigate the associations between knowledge sources and IT it was necessary to categorize the IT applications included in the survey into fewer groups. Thus an exploratory factor analysis was undertaken for this purpose. However, one item (information portals) was excluded because it was classified as an application "not used" by the participating SMEs. As can be seen in Table 4, three components of IT applications were identified. These three components are classified as: IT for codification, Internet-based IT and IT for collaboration.

Table 4: The Factor Analysis Test for IT Applications

IT Application	IT for Codification	Internet-Based IT	IT for Collaboration
Document management systems	<b>.810</b>	.124	.151
Database management systems	<b>.795</b>	.241	.022
Decisions support systems	<b>.739</b>	.101	.318
Workflow systems	<b>.619</b>	.109	.328
Instant messaging	<b>.471</b>	.336	.444
Emails	.074	<b>.882</b>	.053
Internet	.178	<b>.877</b>	.030
Search Engines	.014	<b>.766</b>	.258
Intranet	.317	<b>.608</b>	.090
Video conferencing	-.022	.344	<b>.800</b>
Business intelligence systems	.457	-.197	<b>.654</b>
Groupware systems	.479	-.011	<b>.644</b>
Discussion forums	.368	.393	<b>.632</b>

However, business intelligence systems are not quite collaborative tools, but analytical tools. However they do have capabilities which could be considered as collaborative tools with regard to their use in analysing business data to facilitate decision making. After grouping the IT applications, a correlation test was conducted to investigate whether or not there was relationship between knowledge sources and IT applications. Table 5 provides the results of the correlation analysis.

Table 5: The Correlation between Knowledge Sources and IT Applications

		Internet-Based IT	IT for Collaboration	IT for Codification
External knowledge	Pearson Correlation	.054	.323**	.165*
	Sig. (2-tailed)	.519	.000	.049
	N	143	143	143
Internal knowledge	Pearson Correlation	.135	.051	.292**
	Sig. (2-tailed)	.109	.544	.000
	N	143	143	143

Table 5, shows that there was a positive correlation between external knowledge and IT for collaboration applications. This can be justified by the observation that SMEs tend to engage in collaboration activities and alliances and need such applications to help them in communicating with the external environment, while the internal oriented SMEs tend to codify their internal knowledge so that they can re-use it when they need it. Thus there was a positive correlation between internal knowledge and IT for codification.

#### 4.6 Influencing Factors on IT Usage and Investment

By analysing the qualitative data of the interviews with SMEs' managers, some factors emerged as influencing factors on the decisions on IT use and investment. These factors are discussed below.

Customers and suppliers are significant factors that influence SMEs' use of IT applications. Influence has been noticed either through driving the organizations to adopt or use certain IT applications or by encountering the utilization of IT applications. The SMEs that have business relationships with large organizations were found to have benefited from this by obtaining information, technologies, and knowledge on how to make the best use of IT applications. Conversely, other SMEs' customers and suppliers could be a barrier that counters the use of IT applications. The customers' trust and preferences for using IT applications are the main factors that could cause the failure of IT applications or yield a low level of use. It was found that SMEs were aware of the benefits of using some IT applications and were willing to use them, but the external entities such as customers and suppliers were reluctant to cooperate or participate, as mentioned by a manager of a computer training centre:

*In terms of communication with our external environment, we have tried to use email to communicate with our clients, but unfortunately, many of our customers do not prefer this way of communication. They prefer face-to-face ways of communication.*

Some SMEs claimed that one of the barriers that they encountered in their use of IT applications was the absence of customized systems and applications. They need developers who can understand their work requirements to be able to develop the applications that meet such requirements. However, off-the-shelf systems, particularly in the most common areas such as accounting, are being adopted and used by some SMEs.

*One of the problems we are facing with IT is that we could not find the one who can develop a system that suits our activities 100%.*

Top management and support are reported in the literature as significant factors for IT success and use (Wong & Aspinwall, 2005). In the case of SMEs, top management could be one person: the manager. Thus, their characteristics (personality, education background and experience) could affect their decisions, preferences, orientations and their ways of management. SME managers' orientations toward IT applications were found as significant factors in adopting and exploiting these technologies. The most significant aspect of managers' characteristics was their previous experience with other organizations. Those who had previous experience with large organizations were found to be keener to adopt advanced technologies and techniques in their management and control, such as the manager of industrial maintenance organization who said:

*My previous experience helps me a lot in understanding the benefits of documentation and how it can be done.*

Awareness of IT benefits could be considered as a part of managers' characteristics. It was noticed among the participants that most of them had either adopted some IT applications for their financial management or were trying to do so. This was because they believed that using IT would assist them to have better financial management and control. This awareness led them to invest in adopting systems to do such tasks. Based on this, it can be claimed that the awareness of the benefits that SMEs can gain from utilizing IT applications for exploiting their internal knowledge and acquiring external knowledge is a significant factor. The more SMEs become aware of these benefits, the more willing they become to adopt and use IT for this purpose.

## 5. CONCLUSION

This research investigated two main issues: the sources from which Saudis SMEs acquire their knowledge to operate and compete; and the extent to which they utilize IT applications for knowledge acquisition. Both internal and external knowledge sources were found to be important to SMEs with differences in terms of the variety of external sources and limitations of internal sources. Among the external sources, customers and suppliers were the most significant sources for SMEs' knowledge, while employees were the main internal knowledge sources that SMEs counted on. The use of IT for such purposes was quite limited among the SMEs except the Internet and email which were found to be intensively used by many SMEs. An association was found between the organizations' orientations towards knowledge sources and the types of IT applications they use. The external-oriented SMEs tended to use IT for collaboration, while internal-oriented SMEs tended to use IT for codification. The level of using Internet-based applications was high regardless of the SMEs' orientation towards knowledge sources. Some contextual factors were found to influence IT use in Saudi SMEs, including their customers and suppliers, organization size and the managers' characteristics, and awareness of the benefits of IT.

This research confirms that different orientations towards knowledge sources can affect the orientation towards IT applications in terms of their types and level of use. It provides better understanding for the influence of Saudi context in which: consultants' services are seldom affordable by SMEs; the customers and suppliers are real barriers to use some IT applications; the lack of specialized providers for IT solutions prevents SMEs from adopting some IT applications; and the limited usage of social networks as an external knowledge source.

Despite the contribution of this research on exploring SMEs practices toward different knowledge sources and IT applications, there is a need for further research. Further research is needed to explore the contextual factors that influence SMEs' decisions on knowledge sources and the use of IT applications. Even though this research briefly discussed some of these factors, in-depth investigation is required to understand the nature of such influences. Replicating this research in different contexts and cultures would be useful to determine the extent to which the findings of this study are generalizable.

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