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Examining the factors influencing knowledge management system (KMS) adoption in small and medium enterprises SMEs

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## Abstract:

**Purpose:** The potential for the adoption of a knowledge management system (KMS) is becoming a crucial matter in small and medium enterprises (SMEs); however, there is a scarcity of studies related to KMS adoption in SMEs. Therefore, the purpose of this study is to advance further our understanding of the factors that influence the KMS adoption process among SMEs.
**Design/methodology/approach:** The collected sample size was 247 respondents. For statistical analysis, Smart PLS (a structural model based tool) was used to build, run and validate the process model. Partial least square (PLS) regression techniques were used to analyze the latent constructs. Smart PLS exhibits both the measurement model and the structural model.
**Findings:** The results indicate that knowledge management capabilities, knowledge sharing, organizational learning capabilities and IT capabilities are the significant factors which influence KMS adoption. This study also identifies some unexpected results.
**Research limitations/implications:** The number of responses obtained from the survey was rather small. However, a larger number of responses would probably have resulted in a more accurate finding. Additionally, this study should be verified via a larger sample to increase its generalization.
**Practical implications:** The result of this study will provide SMEs with valuable guidelines to better understand what factors should be considered as highly important and thus providing decision makers and managers with valuable insights to increase the adoption level of KMSs.
**Originality/value:** The study addresses the research gap by developing and empirically validating a research model of KMS adoption from a different perspective that incorporates critical issues which have never been simultaneously examined.



## Keywords:

KMS adoption, small to medium-sized enterprises (SMEs), knowledge management capabilities, knowledge sharing, organizational learning, organizational culture.


## 1. Introduction

Knowledge management (KM) is crucial for organizations' competitiveness and success (Witherspoon et al., 2013). KM makes organizations incorporate resources and capabilities in a distinctive creative way (Chen and Lin, 2009). Organizational competitiveness is derived mainly from intangible rather than tangible resources. Knowledge is considered to be an intangible resource that is possessed by organizations (Hwang et al., 2008). The growing awareness that knowledge is the most valuable asset to any organization has encouraged organizations to pay a great deal of attention to how to manage these assets appropriately. Organizations that obtain the maximum benefit from their KMS adoption recognize that, most KMS adoptions involve not just technology but business change as well (Tarafdar and Vaidya, 2006). The success of KMSs, just like other information systems (IS), depends on several factors (Quaddus and Xu, 2005, Butler et al., 2009). Thus, firms must prepare themselves appropriately for the successful adoption of

KMSs to facilitate achieving the benefits of skills utilization that is to be gained from KM activities. It is also critically important to confront issues, challenges, and opportunities posed by these activities effectively (Nevo and Chan, 2007).

KMSs have emerged in a variety of patterns in many disciplines. Indeed, there is no one framework for KMSs. KMS is a type of IS that supports and enhances KM processes related to creation, storage, retrieval, diffusion and application of knowledge within and outside an organization (Alavi and Leidner, 2001, Quaddus and Xu, 2005). KMSs have shown their usefulness in various sectors and industries, for example, the public sector (Jain and Jeppe Jeppesen, 2013), non-governmental organizations (Corfield et al., 2013), small-to medium-sized enterprises (Durst and Runar Edvardsson, 2012), the banking industry (Oluikpe, 2012), life insurance businesses (Huang et al., 2011), human service and professional services firms (Palte et al., 2012), and manufacturing organizations (Birasnav and Rangnekar, 2010). Although KM has been studied widely over the past few years in different industries, there is not much literature on KMS adoption (Quaddus and Xu, 2005, 2007). These studies mainly focus on the issues of knowledge processing (Hahn and Wang, 2009), KMS design principles (Richardson et al., 2006), KMS architecture (Pirró et al., 2010), IS success model (Kulkarni et al., 2006), KMS performance evaluation (Mccall et al., 2008), IT applications (Hjelmervik and Wang, 2007) and critical success factors (CSFs) of KMS implementation (Nevo and Chan, 2007). Many researchers have noted that KM has been found capable of improving productivity and competitiveness (Wei et al., 2009), effective acquisition, sharing and usage of information with organizations (Chong and Lin, 2009), decision making (Chou et al., 2008), and organizational performance (Chong et al., 2010). Although KMSs are being used by organizations to leverage knowledge as a resource and to support their KM activities (Kankanhalli et al., 2005, Lee and Choi, 2003), KMS adoption initiatives have failed (Butler, 2003). The failure of KMSs mostly refers to the fact that many organizations concentrate only on IT (Hsu et al., 2007). While KMS is complex and cannot be treated only as technology, cultural and organizational dimensions must also be considered in order for KMSs to be effective (Alavi and Leidner, 1999). other studies have found little improvement in organizational performance and argue that regardless of significant investment in KM (Bogner and Bansal, 2007, Lee et al., 2005), many organizations are still struggling with its implementation. Therefore, understanding how to successfully adopt a KMS remains a high priority, especially since management has made large efforts to take KMS initiatives (Kuo and Lee, 2011).

There is a scarcity of studies on the empirical perspectives of KMSs, especially in the area of adoption (Quaddus and Xu, 2005, 2007). This research addresses this gap via a quantitative empirical research in Jordan. The primary focus of this research centers around the following research question: what are the factors that influence KMS adoption in Jordanian SMEs? The major contribution of this paper is to identify new factors as well as to develop a sense of the relative effect of existing factors such as KM capabilities, knowledge sharing, organizational learning, organizational culture and IT capability on SMEs' approach toward the adoption of KMSs for their businesses. Managing such issues requires an understanding of KMS adoption at the organizational level as well as the factors that may affect this process. In addition, very little research has been conducted and literature found on this research topic in any developing country as well as in the Middle East region. This research study reveals the perceptions as well as the intentions of SMEs toward the factors of KM capabilities, knowledge sharing,

organizational learning, organizational culture and IT capability. These factors are quite differently perceived by the worldwide KM community especially in large enterprises. This research captured the actual decisions taken by the respondents rather than just their intentions to adopt KMS.

KMS adoption is suggested from a knowledge-based perspective to be considered as an organizational innovation that enables a sustainable competitive advantage (Lin, 2007, Quaddus and Xu, 2007, Camelo-Ordaz et al., 2011). Based on this perspective, those firms which effectively manage their KMS adoption can expect to reap a wide range of benefits such as cost reduction, improved decision-making, and increased productivity, market share, innovation, and profitability. Previous studies of KMS adoption tend to focus on large firms (Lin, 2007, Xu and Quaddus, 2012). However, the factors investigated by research of KMSs in large firms cannot be totally applied to SMEs without an understanding of their specific environment (Mcadam and Reid, 2001, Carrillo et al., 2009, Yew Wong and Aspinwall, 2005). More research is needed to get a better understanding of this issue (Durst and Edvardsson, 2012, Chan and Chao, 2008, Massa and Testa, 2011, Burke et al., 2011b). Thus, this research will investigate KMSs adoption in a new context, thereby addressing the research gap and also aiming to provide organizations with practical recommendations with regard to improving their KMS adoption initiatives. Given this background, this paper aims to fulfill the following objective: to advance further our understanding of the factors that influence the KMS adoption process among SMEs in Jordan. This research will strive to provide information that may be valuable to those SMEs facing a decision on how to move forward with KMS adoption. Awareness of key factors may greatly improve SMEs' ability to make such informed decisions. Based on these elements of influence and the manner in which they function, the study can offer decision makers with a stronger justification for their KMS adoption.

To accomplish this objective, in this study, the research model and hypothesized relationships were empirically tested, using a partial least squares (PLS) analysis approach and smart PLS software 2.0. The results of the study will be useful to practitioners formulating appropriate strategies, thus increasing the success rate for adopting KMS in their companies. For practical reasons, this study focuses on the small and medium enterprises (SMEs) in Jordan. The rest of this paper is organized as follows: Section 2 discusses the related literature reviewed for this research study. The subsequent sub-sections outline the research methodology, discuss the empirical findings and present the conceptual model and experimental hypothesis on which the model is based. Section 5 describes the analysis of the data to validate the model and the final Section 9 concludes the paper's results. The discussion and implications for research, limitations and scope for future research are discussed in Sections 6, 7 and 8 respectively.

## 2. Theoretical background

### *2.1 KMS adoption and SMEs*

KM has long since been an established practice (Srikantaiah and Koenig, 2000) but it has not been as popular in the case of SMEs (Durst and Edvardsson, 2012). Despite the importance for firms of all sizes, the literature indicates that the large companies dominate in KMS adoption (Burke et al., 2011a, Cyril Eze et al., 2013). Meanwhile, SMEs have a greater need to update and exploit their knowledge base (Lee et al., 2015, Valentim et al., 2015). Chan and Chao (2008) state that models which are known to work in large organizations cannot be applied directly to

SMEs as an easy solution. KMSs are usually adopted by large organizations because they have extensive knowledge available. Large organizations also have sufficient resources and capabilities for KMS adoption as they have the technical capability and social processes necessary for the effectiveness of a KMS (Liao and Barnes, 2015, Sarrafzadeh, 2008).

Many reasons stand behind the desire of SMEs to facilitate KMS adoption. Firstly, there is decisive worldwide approval of the fact that SMEs perform an active role in the development process of less developed economies. Although SMEs may suffer from a lack of insufficient financial and technical expertise and human resources, SMEs also may lack formal policies (Dotsika and Patrick, 2013, Lin, 2014). Accordingly, KMSs are expensive to adopt, deploy, maintain and support. On the other hand, Chen et al. (2012) suggested that know-how and knowledge are the most crucial resources for SMEs over any other resources they may have or use. In general, SMEs have a flat and a less complex organizational structure, and their open culture supports knowledge sharing, and encourages collaboration and a flexible management style that will eventually promote entrepreneurship and support strong innovation potential accompanied with elastic and adaptable processes (Wee and Chua, 2013). SMEs are generally informal, less bureaucratic in decision-making and there are few procedures. Supervision is attached to the owner's management style (Wong and Aspinwall, 2005). These characteristics provide SMEs with organizational flexibility and adaptability that is critical to successful KMS adoption (Yee-Loong Chong et al., 2014).

The adoption of KMSs in SMEs has been influenced by well-known factors which have been recognized in the literature: organizational infrastructure and information technology, culture, strategy and purpose, management leadership support and measurement (Wong and Aspinwall, 2005). Rapid technology evolution and popularization has influenced most SMEs to adopt the latest technology such as utilizing the Internet as the platform for hosting their knowledge assets. Through such an open platform, organizations' knowledge is highly exposed through the public domain. A comprehensive literature survey in Durst and Edvardsson (2012) reveals that KMS in SMEs are still limited and suggests that future consideration must be given to KMS in SMEs in four areas including knowledge identification, utilization and storage. Despite evidence that KMS improve performance and competitive advantage (Denning, 2006), managing knowledge in SMEs is often disregarded mainly owing to inadequate awareness among managers, costs and budget issues (Chin et al., 2012, Wong and Aspinwall, 2004).

Generally, a wide range of factors that can influence KMS adoption has been mentioned in the literature. Much has been stated about the technical dimension and non-technical dimensions including cost-effectiveness, social, environmental, and personal psychological dimensions (Kuo and Lee, 2011, Boh, 2008, Hung et al., 2005, Kankanhalli et al., 2011, Lee and Chen, 2012, Lai et al., 2014, Lai et al., 2009). Wong and Aspinwall (2005) examined 11 CSFs for KMS adoption in SMEs. Their research confirms that management leadership, support and culture emerge to be the most significant issues for the success of KMS adoption. In their papers, Kushwaha and Rao (2015), Nevo, Furneaux et al. (2008) and Wakefield (2005) argued that knowledge management strategy is one of the key success factor. Further, Akhavan et al. (2006) listed five categories of factors which could be influential in the process of KMS adoption namely leadership, culture, structure, roles and responsibilities, IT infrastructures and measurement. Desouza and Awazu (2006) also highlighted five attributes of KM in SMEs, which include the lack of explicit

knowledge repositories as the key distinct characteristic in SMEs. Chan and Chau (2005) and Chua and Lam (2005) pointed out that the two most important factors in KMS adoption are leadership and top management commitment. Studies by Cross and Baird (2000) and Chan and Chau (2005) argued that IT infrastructure would have a significant role in KMS adoption. In his study Jeffcoate et al. (2000) confirmed that SMEs is enduring from scarcity of technological expertise and knowledge. Lim and Klobas (2000) stated that SMEs require more of KM processes understanding. Issues such as strategic human resource management (SHRM), IT, quality and marketing were suggested by Chourides et al. (2003) as important critical factors for KMS adoption.

SMEs face unique KM challenges which are distinct from those of their larger business counterparts. Becerra-Fernandez, Gonzalez et al.(2004) indicate that organizational size would also appear very significant and has a direct impact on different KM processes. An SME, with less capitalization than large companies, may face considerable risk in taking on a large IS project such as the implementation of a KMS (Becerra-Fernandez et al., 2004). However, the literature is still rather limited in terms of presenting a comprehensive picture of the issues related to KMS adoption in SMEs. The majority of publications are based on case studies which take snapshots of specific KM solutions and their implementations (Wong and Aspinwall, 2005, Patil and Kant, 2014, Pei Lyn Grace, 2009). This would make SMEs a more attractive topic to be discussed (Judge, 2009), as SMEs operate more informally and socially than large enterprises.



## 3. Research model and hypotheses development

*3.1 Research model.*

This study attempts to better understand the factors that influence the KMS adoption process among SMEs. On the other hand, since it was not possible to include all the potential factors affecting KMS adoption, the choice of theoretical constructs in the current study was determined through an extensive literature review as well as informal conversations with KM developers and experts. The new model which is developed from this theoretical connection provides a theoretical framework for identifying the key variable that influences the adoption of KMS.

The dependent variable has been identified as knowledge management system KMS adoption by SMEs. Several independent contextual variables (factors influencing the dependent variable) have been also identified as: (1) knowledge management capabilities (2) knowledge sharing (3) organizational learning capabilities (4) organizational culture and (5) IT capability. This study attempts first to examine knowledge sharing, organizational learning and organizational culture. Secondly, this study has chosen KM capabilities and IT capability as important antecedents of the KMS adoption process, since they enable different activities that facilitate knowledge, and enhance cooperation within the organization (Wang et al., 2007), so KM capabilities and IT capability are included here, as this study aims to test their applicability in a different national context (Jordan). The variables in the research model and hypotheses are detailed below. Fig. 1 shows the research framework on which this research study is built.

Fig. 1 The research model

*3.2 Hypotheses development*

*3.2.1 Knowledge management capabilities*

According to the knowledge-based perspective, KM capabilities can be classified into 'knowledge assets', defined as the intangible assets that can be utilized to further enhance organizational performance through a series of value creation processes and obtained through experience and learning (Miller et al., 2007). Many researchers use the term intangible assets or intellectual capital whenever they refer to the expression 'knowledge assets'. There have been several approaches in which KM literature categorize knowledge assets (Marr et al., 2004). Knowledge assets are recognized by most researchers as human, relational, structural and information capital (Huang, 2009). Knowledge assets are highly regarded as the experience of organizations' employees and skills and knowledge gained. Furthermore, they could be considered as the result of the process of knowledge transformation (Namasivayam and Denizci, 2006).

On the other hand, the second component of KM capabilities is knowledge process capabilities, which refers to the capacity to which the organization is capable of exploiting knowledge assets to generate valuable knowledge in a course of coordinated knowledge activities (Alavi and Leidner, 2001, Gold and Arvind Malhotra, 2001). Knowledge process capabilities are estimated to offer systematic and consistent knowledge support to functional and regular organizational

activities (Singh Sandhawalia and Dalcher, 2011). Knowledge processes capabilities are expected to represent valid common factors across different organizations (Chong et al., 2010). Researchers have anticipated different knowledge process models that are most frequently associated with different types of activities that aim to identify different sets of knowledge functions. Lytras and Pouloudi (2006) consider knowledge processes as a phenomenon of technical and social order and present a model that integrates three elements involved with KM: people, groups and organization. Gold and Arvind Malhotra (2001) assume that knowledge infrastructure capability (technology, structure, and culture) along with knowledge management capabilities (acquisition, conversion, application, and protection) are essential organizational capabilities for effective KM.

More specifically, some studies have distinguished the significant relationship between knowledge assets and knowledge process capabilities through the support of organizational practices to gain competitive advantage (Gold and Arvind Malhotra, 2001, Lee and Choi, 2003). An organization can achieve sustained competitive advantage from knowledge management capabilities, which can be obtained from utilizing knowledge assets while the assets are linked with intellectual properties in a way that is difficult to imitate for competitors (Felin and Hesterly, 2007). Other studies have highlighted the association between knowledge assets and knowledge acquisition or dissemination (Darroch, 2005, Lee and Choi, 2003). KM capabilities, namely assets and processes, provide the support structure required to share knowledge within the context in which it is required. Organizations aim to develop KM capabilities into a state where KM practices are institutionalized and embedded into their daily work practices (Singh Sandhawalia and Dalcher, 2011). Therefore, this research argues a possible linkage between knowledge capabilities and KMS adoption. Based on the above, it is suggested that:

**Hypothesis 1 (H1):** Knowledge management capabilities have a positive effect in terms of knowledge sharing.
**Hypothesis 2 (H2):** Knowledge management capabilities have a positive effect in terms of organizational learning.
**Hypothesis 3 (H3):** Knowledge management capabilities have a positive effect on SMEs' adoption of knowledge management system.

*3.2.2 Knowledge sharing*

Knowledge sharing (KS) can be defined as the process of know-how that facilitates collaboration among employees to challenge a turbulent environment (Cummings, 2004). Organizations embrace a rational probability that KMS adoption will promote knowledge sharing effectively (Chen et al., 2012). Knowledge sharing implementation involves a dual process of knowledge donating and collecting through activities such as learning (Bosua and Scheepers, 2007). In an ideal case, knowledge sharing enables individuals to learn and gain more knowledge, hence enhancing employees' skills and competencies (Matzler et al., 2011). Lin (2007) defines knowledge sharing as a significant organizational process which improves an organization's capability to generate new ideas and create new business opportunities through organizational learning. Knowledge sharing also facilitates personal learning to be associated with others' knowledge, integrating and promoting knowledge to the organizational level. Mixed results have been found in studies investigating the relationship between knowledge sharing and organizational learning. Ho (2008) points out that an appropriate culture for independent learning

is essential to encourage the organization's staff to become individual learners, which enhances the opportunity for them to participate in effective learning activities (Chawla and Joshi, 2011). Taylor and Wright (2004) found that an environment that supports idea generation and concentrates on learning from failure was completely linked to successful knowledge sharing. Similarly, as argued by Hsu, Ju et al.'s (2007) knowledge sharing is an important aspect that supports permanent learning activities. Similarly, Lee et al. (2006) found that no significant relationship between knowledge sharing and learning orientation. In another study, Kim and Lee (2006) however, failed to find a significant relationship between knowledge sharing and organizational learning. Moreover, previous research suggests that knowledge sharing is assumed to be a crucial input to effective KM and organizational learning (Janz and Prasarnphanich, 2003). Fletcher and Prashantham (2011) confirm that the association of knowledge sharing with organizational culture is essential for KMS adoption. Furthermore, they argued that a potential justification is that a sharing culture may motivate employees to get involved in KMS activities willingly and create a learning context that endorses employee desire for knowledge. Therefore, it is realistic to believe that sharing culture will help encourage SMEs to adopt and implement KMS activities. Previous studies indicate that the need for knowledge sharing is critical to the effectiveness of KMS adoption activities (Mcdermott and O'dell, 2001). SMEs can successfully enhance KMS adoption not only by directly incorporating knowledge in their business strategy but also by creating a knowledge sharing environment that accommodates KMS (Lee et al., 2008, Egbu et al., 2005). Based on the review of literature undertaken, an organizational factor that is considered critical to the success of KMS adoption in SMEs is knowledge sharing (Wong and Aspinwall, 2004, Alam et al., 2009, Ling, 2011). Knowledge sharing is critical in SMEs to create a supportive climate and provide adequate resources to facilitate KMS adoption. Based on the above, it is suggested that:

**Hypothesis 4 (H4):** knowledge sharing has a positive effect on organizational learning
**Hypothesis 5 (H5):** knowledge sharing is positively related to the adoption of knowledge management system by SMEs.

*3.2.3 Organizational learning*

The persistence of economic instability and environment uncertainty hinders the capability of many organizations to face these challenges in the market thus many are striving to survive and remain competitive. Organizational learning (OL) has been found to resolve this issue since it has been identified as one of the important elements in the process of achieving long-term organizational effectiveness (Argote and Miron-Spektor, 2011). OL encourages the development process of knowledge management capabilities and resources which can optimize and sustain organizations' competitive advantage (Njuguna, 2009). Similarly, OL can facilitate the modification and improvement of organizational knowledge (Swart and Kinnie, 2010). The depth and diversity of knowledge can be increased through OL activities in the organization. In fact, the more the organizational learning capabilities, the higher the level of the competitive advantage gained (Chiva and Alegre, 2005). In the KM literature, OL is well-acknowledged as one of the most significant approaches in which the businesses can constantly advance the creation and exploitation of important knowledge (Zhao et al., 2013). OL facilitates the integration of organizational knowledge into organizational processes by encouraging the creation, transfer and application of knowledge so that it can constantly improve knowledge management capabilities of organizations (Valmohammadi, 2010). Moreover, appropriate

knowledge acquisition, sharing, use and storage are key elements in organizational learning process accomplishment (Gold and Arvind Malhotra, 2001). Jain and Moreno (2015) also point out that knowledge is a significant strategic resource of OL and, more specifically, knowledge management capabilities (acquisition, dissemination and integration).

These studies tend to show that OL is very complementary to KM (Easterby-Smith and Lyles, 2011). The existence of an organizational context that accommodates learning could encourage an organization's employees to participate in knowledge sharing. Previous studies recommended that it is necessary for the knowledge sharing process to go through both formal and informal learning platforms (Ipe, 2003). The organizational learning context is essential in knowledge sharing initiatives (Lin, 2007). Zollo and Winter (2002) argue that individual knowledge possessed by employees should be embedded into the organizational knowledge. Anderson and Boocock (2002) recommend that the channels of communication are the major components which promote learning and thus encourage employees not to rely on unattainable tacit knowledge but rather make enquiries to gain the required knowledge. From the previous discussion, it is apparent that organizational learning has a strong prescriptive factor which is to "manage knowledge" in order to accomplish a constructive influence on KMS adoption activities. Organizations that intend to grow to be and remain leaders are most likely to make great efforts to learn faster and use knowledge more effectively (Pemberton and Stonehouse, 2000). Therefore, it is justifiable to believe that an appropriate organizational knowledge context will help encourage SMEs to adopt and implement a KMS. Based on the above, it is suggested that:

**Hypothesis 6 (H6):** Organizational learning has a positive effect on knowledge management capabilities.
**Hypothesis 7 (H7):** Organizational learning has a positive effect in terms of knowledge sharing.
**Hypothesis 8 (H8):** Organizational learning has a positive effect on SMEs' adoption of a knowledge management system.

*3.2.4 Organizational culture*

The impact of organizational culture (OC) on knowledge management has been examined by many scholars (Bock et al., 2005, Janz and Prasarnphanich, 2003). Organizational culture is considered to be a crucial factor for effective KM (Mårtensson, 2000). Creating a culture that supports knowledge creation and sharing is a top priority if KMS projects are to succeed (Gupta and Govindarajan, 2000). Many studies have found organizational culture to be highly important for employees' KS behaviors (Sackmann and Friesl, 2007, Mcdermott and O'dell, 2001). As Irani et al. (2009) conclude in their study, knowledge culture has been established by organizations to represent a group of assumptions which value knowledge sharing and integration between individuals, and groups. The main challenge for nearly all KM attempts actually lies in building such a culture. Similarly, Chase (1997), in his survey, confirmed that developing an effective knowledge-based organization is the biggest barrier confronted by an organizational culture. A number of challenges occur when knowledge sharing is to be accommodated within the organization, among them organizational culture, which is considered to be the most prominent (Janz and Prasarnphanich, 2003). Alavi et al (2005), for example, indicated that different types of knowledge-sharing behaviors will appear as a result of the different types of organizational culture adopted by the organization. However, few studies have

examined the way culture shapes knowledge sharing efforts. Furthermore, prior research in organizational culture (Hartnell et al., 2011) identifies four kinds of organizational culture (i.e. innovative, competitive, bureaucratic and community). Specific cultural characteristics have been found to prevent knowledge sharing, whereas others encourage knowledge sharing (Wiewiora et al., 2013). Cultural expectations influence knowledge sharing activities, for example, what knowledge should be shared and what should not be, how flexible and quick the exchange of knowledge through formal communication channels is and what knowledge is to be considered important and what knowledge should be prevented from spreading across the organization. Wiewiora et al. (2013) argue that cultural assumptions linked to issues such as employee engagement, an unsupportive environment, informality, teamwork and collaboration encourage knowledge sharing.

The KMS adoption process is considered as an incorporated and complicated social process that incorporates many factors, such as culture, as its essential elements. SMEs should move to allow individuals to introduce ideas for new opportunities and further enhance a more positive and open organizational culture for KMS adoption (Lopez-Nicolas and Meroño-Cerdán, 2009). Thus, refining an effective organizational culture in SMEs is not simple during the KMS adoption process. The existence of a bedrock organizational culture helps reduce resistance to KM adoption, while in the absence of such a culture, successful KMS adoption might not exist. Thus, the study aims to examine the influence of organizational culture on knowledge sharing, as well as the influence of organizational culture on KMS adoption. Based on the above, it is suggested that:

**Hypothesis 9 (H9):** Organizational culture has a positive effect in terms of knowledge sharing.
**Hypothesis 10 (H10):** Organizational culture is positively related to SMEs' adoption of knowledge management system.

*3.2.5 IT capability*

IT capability can surely play a range of roles to support organizational performance given that IT capability refers to an organization's capacity to exploit IT applications that encourage the KM and business processes (Alavi and Leidner, 2001, Ravichandran et al., 2005). Literature in the management field has focused on understanding what KM is, what the process is that is used to create, transfer and share knowledge and how IT can enhance organizations in influencing KM capabilities (Kebede, 2010, Wallace et al., 2011). The process of KM creation depends entirely on IT, which is seen as a vital facilitator of KM capabilities (Ruiz-Mercader et al., 2006). IT capability plays a crucial role in shaping KMS adoption's success or failure (Johannessen et al., 2001). Previous studies have found that IT plays a crucial role in online knowledge sharing and the KM capabilities (Nishimoto and Matsuda, 2007). The appropriate accessibility and knowledge sharing are ensured by the effective use of IT-based systems (Harrison and Daly, 2009). Preferably, the IT must be a platform that empowers knowledge sharing as a component of the KM initiatives (Hasanali, 2002) . Liao et al. (2007) argue that knowledge sharing is generally maintained by knowledge exchange through IT. Helping SMEs to improve performance as well as to encourage knowledge exchange within the organization relies on the ability of IT to develop knowledge access and facilitate collaborative work among individuals. According to Riege (2005), a broad collection of IT that supports KM ensures that a vast quantity of knowledge is made reachable to users within the organization. Thus, the

implementation of functional IT applications in SMEs enables better knowledge sharing. IT has made the exchange of explicit forms of knowledge a cost-effective process (Davis et al., 2005), which is particularly essential for the hardware and other IT sources of the organizational knowledge base.

Regarding SMEs specifically, IT is considered as the main facilitators of KMS adoption and thus indisputable. Previous studies acknowledge that an organization with a top level of IT competency is more likely to adopt new technology (Kamal, 2006). Kulkarni et al. (2006) suggest that organizations need top-quality IT systems that are beneficial and able to influence KM capabilities. The greater the IT capability in SMEs the more it is expected that they will have sustainable growth and develop KM best practices (Lin, 2014). Organizations that have adopted IT successfully have helped improve technical knowledge, have accommodated expertise for adopting new IT solutions, and have gained a better perspective of the organizational impact of new IT (Zhu et al., 2006). Such skills and capabilities are important for effective IT adoption and these can be achieved through learning-by-doing (Lane et al., 2001).

Due to a perceived lack of IT capability in SMEs, different studies have emphasized the lack of the necessary managerial expertise to manage the implementation of IT applications (Lin, 2014). IT applications have enhanced the KM capabilities as well as improving user experiences with enterprise applications by leveraging enterprise applications' attributes, which has made the practices of KM activities much easier (Chadha and Saini, 2014). According to Finestone and Snyman (2005), an organization's environment is enormously diversified and thus, IT can be a major concern for KMS adoption, especially if it does not meet user expectations or complement business-wide programs. However, Kebede (2010) emphasizes that organizations should not overlook the role of IT, which is most essential in the KMS adoption process. KMs' success or failure depends largely on how individuals exploit technologies that are linked to KM. Based on the above, it is suggested that:

**Hypothesis 11 (H11):** IT capability is positively related to knowledge management capabilities.
**Hypothesis 12 (H12):** IT capability has a positive effect on knowledge sharing efforts.
**Hypothesis 13 (H13):** IT capability is positively related to the adoption of KMS.

## 4. Research methodology

The present study was undertaken to measure the level of KMS adoption in Jordan. As previous research has mainly concentrated on developed countries, there is still very little known about the factors that influence knowledge management adoption in a developing country. To overcome this research gap, in this study the author decided to choose the context of a developing country. The literature review was the theoretical foundation for the secondary data obtained and as a result of the extensive literature survey, five core variables were identified. Subsequently, primary data from 247 respondents was collected using a survey instrument. The research methodology is centered on the already identified existing core variables. Hence, a simple direct relationship of these core variables has been used to create the research model to understand which of them is the most dominant. To further quantify, a detailed questionnaire was used to gather the formal data (primary data) from the various SMEs, primarily based in Jordan. The collected sample size was 177 during the first half of 2015. For statistical analysis, Smart PLS (a structural model-based tool) was used to build, run and validate the process model.

Partial least square (PLS) regression techniques were used to analyze the latent constructs. Smart PLS exhibits both the measurement model (outer model) and the structural model (inner model).

*4.1 Survey procedure and sample*

The data for this study were collected using a survey questionnaire administered in Jordan. This survey was administered only to those businesses that were well aware of the KMS practices with 50 or more employees that represented different industry sectors. The purpose of this research was clarified on the front page of the survey instrument and it was made clear that the confidentiality of the data would be preserved. The questionnaire was divided into two parts. The first part of the survey captured the adoption of a KMS. For each latent construct, three to five questions (indicators) were formulated capturing the adoption of a KMS by SMEs. The second part of the survey captured the demographic details of the respondents.

The survey instrument was administrated to about 480 participants of SMEs in Jordan in different industries. After two weeks, upon sending out the questionnaires, a follow up with companies through phone calls and in some cases, site visits was performed. Data were collected from 247 SME IT managers as the key information source due to their knowledge and familiarity with the KM system. From the total responses in the research, 53 were excluded from further analysis as they belonged to companies with less than 50 employees or had failed to provide a response on the number of employees in the organization. After editing, 194 were taken in and 177 had usable data. Of the population of 480 KMS users, 177 usable questionnaires were completed, a response rate of 36.8 per cent. Questionnaire distribution and collection were completed within ten weeks from the date of dissemination. Before the survey was administered, fellow researchers reviewed the instrument along with practitioners familiar with the KMS being studied. Of the 177 responses, 27 were women (15.2 per cent). The demographic profile of the respondents matched the profile of the sampling frame, thus minimizing concerns about nonresponse bias.

*4.2 Questionnaire design and measures*

Whenever possible, the study used existing scales from the literature for measurement items. However, this differed in the case of KMS adoption. KMS adoption did not have a standard questionnaire and therefore, a scale based on the interpretation of the literature was developed. In the end, some modifications were made to align the scales with the KMS context. To ensure content validity, items selected from the constructs were mainly adapted from previous researches and modified for use in a KMS context. The questionnaire consists of two sections. Section one contains demographic and background information of the respondents and the respective SMEs. Section two comprises items measuring the constructs. Respondents were asked to state the extent to which each item was true for them on a five-point Likert-type scale ranging from “Not at all (strongly disagree)” to “Very often (strongly agree)”. It was decided to use the five-point Likert scale because prior related studies involving SMEs used a similar scale (Alam et al., 2009). This survey was administered to them in different two forms, namely hardcopy (paper-based) forms and face-to-face interviews.

To develop the survey instrument, four and five items related to the five constructs of the research model were adopted from the existing literature and refined based on the context of this study. The knowledge management capabilities construct is composed of four items that were

sourced and adapted from Alavi and Leidner (2001) and Gold and Arvind Malhotra (2001). The four items for knowledge sharing were adapted from Gold and Arvind Malhotra (2001), while the five items for organizational learning were based on the constructs of Vandenbosch and Higgins (1996). On the other hand, the four items for organizational culture were adapted from Hooff and Huysman (Van Den Hooff and Huysman, 2009). Lee and Choi's (2003) four-item IT capability construct was also adapted for this study.

### *4.3 Data analysis*

Structural equation modeling (SEM) is a statistical technique that was employed to examine the causal relationships which exist between multiple independent and dependent constructs. A partial least squares approach (PLS) was then used to analyze the data. PLS is a common methodological approach which does not impose sample size and distribution restrictions (Chin et al., 2003). PLS is suitable for small sample analysis (Chin and Newsted, 1999). Barclay, Higgins et al (1995) recommend that when using PLS a minimum sample size that is ten times the greater of the largest number of predictors leading to an endogenous (dependent) construct is required. PLS has the ability of modeling latent constructs under conditions of fewer statistical constraints on the data (e.g. assumptions of non-normality). Thus, this study requires a minimum sample size of 50 and therefore, 177 usable responses are adequate for data analysis using PLS. The data were analyzed using the Partial Least Squares approach (PLS) employing the Smart PLS 2.0 M3 software (Ringle et al., 2010), In this study, raw data were used as input to the PLS software program, and path significances were estimated using the bootstrapping resampling technique with 500 subsamples. The researcher employed a two main-stages approach of model testing for data analysis using PLS (Hair et al., 2010). Confirmatory factor analysis (CFA) was first applied to assess the measurement model's validity and reliability of theoretical constructs. The associations hypothesized in the present research model were then tested using the structural model. The sequence of model testing steps is argued by Fornell and Yi (1992), in which they confirm that a valid structural theory test cannot be performed with bad measures, and therefore the measurement model was tested prior to testing the structural model. Therefore, prior to drawing conclusions in terms of relationships among constructs, the previous sequence of model testing ensures that the constructs' measures are valid and reliable (Barclay et al., 1995).

## 5. Results

An important conclusion of this research is that KM capabilities are not the most important factor for SMEs to adopt KMS. Knowledge sharing and IT capability are considered to be the top two priorities for them to adopt KMS, followed by KM capabilities. This indicates that SMEs are happy to adopt KMS due to its knowledge sharing' and better IT capability besides KM capabilities. Following the previously described order, which was presented in the method section, the estimation of the measurement model must come first for the sake of analyzing the results obtained. In terms of constructs consisting of multiple reflective indicators (as is the case in this study) a confirmatory factor analysis (CFA) was performed to examine, individual item reliability, construct reliability, convergent validity, and discriminant validity. In this respect, all the tests carried out have shown satisfactory results, as given below:

**Table 1.**

*5.1 Measurement validation and reliability*

The reliability of these research measurements was evaluated using indicator loadings and composite reliability scores. In this respect, all the tests carried out have shown satisfactory results. Indicator loadings (individual item reliability) are greater than 0.7; a rule of thumb is to accept items with loadings of 0.707 or more (Barclay et al., 1995). Construct reliability is the degree to which items are free from random error and, therefore, yield consistent results. This study calculated the reliability of measures using Bagozzi, Yi et al.'s (1998) composite reliability index and Fornell & Larcker's (1981) average variance extracted index.. Composite reliability (which measures construct reliability) is higher than 0.8 in all cases. According to Nunnally (1978), 0.70 constitutes a benchmark for modest reliability in early stages of research, whereas later on, values higher than 0.80 would be preferable. Composite reliability is considered a more rigorous estimate for reliability (Chin & Gopal, 1995). As shown in Table 1, the composite reliability scores exceed 0.8; on the other hand, Table 2 indicates that indicator loadings (individual item reliability) are above the recommended cut-off of 0.7. Thus the model can be considered as reliable.

*5.2 Convergent validity*

Examining convergent validity requires that each item's loading on its underlying construct should exceed 0.70 (Chin et al., 2003). Furthermore, convergent validity of measurement items in this study was verified by examining composite reliability (CR) and average variance

extracted (AVE) through CFA. Convergent validity of the scale items was assessed by the criteria recommended by Fornell and Larcker (1981): (A) all item factor loadings of the indicators should be significant and greater than 0.7; (B) for each composite reliability (CR), values should be above 0.7; (C) average variance extracted (AVE) for each construct should exceed the variance due to measurement error for that construct (i.e. AVE should exceed (0.5). As shown in Table 2, all the factor loadings (ranging from 0.73to 0.91) were statistically significant, and met the criterion being above 0.7. Additionally, all the CR values (ranging from 0.825 to 0.927) were higher than 0.8, indicating the adequate reliability of the measurement model. Finally, the values for the AVE ranged from 0.646to 0.806, indicating that each construct was strongly related to its set of related indicators. Based on these results, it was thus concluded that the measurement model exhibited adequate convergent validity. Also, in Table 3 the item-to-construct correlation vs. correlations with other constructs shows that the indicators are part of the highlighted constructs only and are not part of other constructs.

**Table 2.**

**Table3.**

**Note**: The highlighted bold face numbers are the item loadings on the constructs.

*5.3 Discriminant validity*

Discriminant validity of constructs is examined to indicate the degree to which the measures in the model differ from other measures in the given model. The standard for discriminant validity, in the PLS perspective, is that a construct should demonstrate more variance with its measures than it could with other constructs in the same model (Hulland, 1999). Correlations between the measures of possible overlapping constructs were examined to investigate the discriminant validity and also to ensure that they were different from unity (Anderson and Gerbing, 1988).

The highest correlation among any two constructs should be greater than of 0.60. Table 3 demonstrates that the correlation between any two constructs exceeds 0.7.
Discriminant validity of the constructs was assessed using the recommendation of Fornell and Larcker (1981): the square root of the AVE of each construct should exceed the inter-correlations between the construct and other constructs (Fornell and Larcker, 1981). As shown in Table 4, square roots of the AVEs are shown in the main diagonal. The off-diagonal elements are the inter-correlations among constructs. For satisfactory discriminant validity, the square root of the AVE should exceed the off-diagonal elements. The test shows that all the diagonal values exceed the off-diagonal values. Hence, it can be concluded that all the constructs are different from each other and the measurement model demonstrated adequate discriminant validity.

**Table 4.**



**Note:** Value on the diagonal is the square root of AVE.

*5.4 Assessment of the structural model*

Next, the causal relationship of the hypotheses generated out of this research was tested by examining the structural model using Smart PLS software. As PLS does not rely on any distributional assumption, so it is not suitable to assess the significance of the path coefficient by the use of normal theory (Henseler et al., 2009). An assessment of the structural model includes estimating the path coefficients and the R-square value. Path coefficients explain the strengths of the relationships between the independent and dependent variables, whereas the R-square value

is the percentage of variance explained by the independent variables. To determine the statistical significance of the hypothesized relationships, according to Chin's (1998) recommendation, the bootstrapping re-sampling procedure was employed (with 500 sub-samples) defined within the structural model to examine the statistical significance of path coefficients using t-statistics. The bootstrapping results in a larger sample, which is claimed to model the unknown population (Henderson, 2005). Conclusions were drawn from the data of the new sample. The t-tests for the standardized path coefficients and calculated p-value were verified based on a tow tailed test with significance levels of 0.05, 0.01. A 5% significance level ($p < 0.05$) was used as a statistical decision criterion (Cowles and Davis, 1982). The results of the structural model are summarized in Table 5.

It is observed that not all the hypotheses are supported. Three hypotheses, H9, H10 and H11 are not supported significantly. As observed, hypothesis H1 is supported because the path from knowledge management capabilities to knowledge sharing is significant ($b = 0.184$, $p < 0.01$). This is because the greater the knowledge management capabilities due to the adoption of an advanced knowledge management system, the better the knowledge sharing. Hypothesis H2 is supported ($b = 0.\ 0.189$, $p < 0.01$). This is because the greater the knowledge management capabilities, the better the organizational learning. Hypothesis H3 is supported, indicating knowledge management capabilities is one of the primary reasons for SMEs to adopt ($b = 0.\ 0.294$, $p < 0.05$) a KM system. Hypothesis H4 ($b = 0.288$, $p < 0.01$) is supported because the stronger the knowledge sharing of using a KM system, the higher the possibility of organizational learning. Hypothesis H5 ($b = 0.453$, $p < 0.01$) is strongly supported because the strength of knowledge sharing in using KM systems is the primary reason for driving them to adopt a KMS. Hypothesis H6 ($b = 0.496$, $p < 0.01$) is supported because improvements in organizational learning would increase the confidence of SMEs to move to KMS adoption, resulting in better knowledge management capabilities. Hypothesis H7 ($b = 0.488$, $p < 0.01$) is supported because better organizational learning from KMS adoption strengthens knowledge sharing. Hypothesis H8 ($b = 0.364$, $p > 0.1$) is supported because SMEs' perception about organizational learning is relatively good, resulting in the adoption of the KMS. Hypothesis H9 ($b = 0.135$, $p > 0.1$) is not supported because currently the SMEs do not find culture as influential as it should be. Hence, these SMEs are not willing to share knowledge through a KMS. Hypothesis H10 ($b = 0.128$, $p > 0.1$) is not supported, as seen from the fact that the existing organizational culture in SMEs is not capable of supporting KMS adoption. Hypothesis H11 ($b = 0.\ 054$, $p > 0.1$) is not supported because SMEs are aware of the challenge that the increasing demand for more IT capability will not be in favour of the cost-effective policies adopted by the organization. Thus, IT capability does not influence the effectiveness of new knowledge management capabilities. Hypothesis H12 ($b = 0.068$, $p < 0.05$) is supported because a better IT capability enhances the organizational learning for SMEs, as they could be more productive. Hypothesis H13 ($b = 0.218$, $p < 0.01$) is strongly supported because the higher and better the IT capability, the higher the adoption of the KMS.

**Table 5**

*5.5 Assessment of fit*

PLS does not generate overall goodness-of-fit indices. However, it is recommended as a global fit measure for PLS path modeling. GoF ($0 < GoF < 1$) is defined as the geometric mean of the average communality/AVE and average (R2), which explains the variance in the endogenous construct (GoF = _AVE ∗ R2). The value of GoF has been calculated in respect of the procedure (Wetzels et al., 2009), which validates the PLS model of this research study. Following the benchmark values for justifying the PLS model globally,(GoF small = 0.1, GoF medium = 0.25and GoF large = 0.36) (Akter et al., 2011), the GoF value for this research model is 0.480 (AVE was 0.682 and average of R2 was 0.342). The GoF value for the model is greater than the lowest cut-off value of 0.36 for large effect sizes of R2. The GoF value affords sufficient support to justify the PLS model (Wetzels et al., 2009). Therefore, the variance explained (R2) in the endogenous variables and the structural paths provides adequate support to validate the structural model, as presented in Table 1.

## 6 Discussion

SMEs play a crucial role in the economy. Given the high failure rate of SMEs, it is expected that better KMS adoption initiatives in SMEs will contribute to enhancing their performance and competitive advantage. This study demonstrates and validates a research model towards a better understanding of the factors that influence KMS adoption. The results demonstrate that these factors have different effects on KMS adoption. In particular, IT capability has the strongest effect on KMS adoption, while contrary to what was expected and inconsistent with the literature on organizational culture, this study found that culture did not significantly influence KMS adoption. The proposed model will provide SMEs with guidance for KMS adoption initiatives.

Based on the construct and variables of the model and the results of this study, policy makers, managers and other stakeholders can gain a better understanding of the KMS adoption process and can leverage SMEs by appropriate strategies to push their KMS adoption initiatives.

The results demonstrate that KM capabilities (acquisition, conversion, application and protection) influence KMS adoption, thus supporting H1–H3. In addition, KM capabilities (through an increased emphasis on organizational learning and enhancing knowledge sharing) have a significant indirect effect on KMS adoption, thus strengthening the total impact of KM capabilities on KMS adoption. This result is in line and consistent with the research findings of Jerez-Gomez, Cespedes-Lorente et al. (2005), who argue that KM capabilities is a crucial element in facilitating organizational learning. KM capabilities appear to work as an input, and organizational learning will appear as an outcome. Contrary to Lin and Lee's study (2004), the findings of this research show that KM capabilities influence organizational learning indirectly. The KMS that facilitates the creation of new knowledge and updating existing knowledge improves the opportunity to accommodate learning (Malhotra, 2004). The results of this study reveal how KMS is enhancing innovative organizational learning. Additionally, the results of this research support the hypotheses that KM capabilities positively influence KMS adoption, a finding that is consistent with Gilbert and Cordey-Hays' (1996) perception of KM capabilities as the facilitator of successful technological adoption. Moreover and in agreement with previous studies (Sorenson, 2003), the findings of this study also reveal that KM capabilities significantly influence knowledge sharing which in turn leads to support the process of creating new knowledge through sharing experiences and exchange of knowledge among organizational members. Knowledge accumulation enables employees to use accessible knowledge and generate new knowledge, both of which are essential for KMS adoption. Accordingly, in the KMS adoption context, it is important to acknowledge that managers should inspire employees to generate and use knowledge effectively. It is imperative for KMS to efficiently facilitate users to absorb new knowledge (Alavi and Leidner, 2001, Lien et al., 2007). That is, if organizational KM capabilities are directed towards making knowledge valuable, firms are more likely to accomplish better levels of KMS adoption. The results of the study indicate, however, that KM capabilities are influential and employees do consider the relationship between KM capabilities and Knowledge sharing as significant. This has made this result consistent with previous studies (Egbu et al., 2005), which show that the improvement of KM capabilities can assist in the KMS adoption success. Therefore, from previous results it may possible to draw the conclusion that enhancing KM capabilities is an important approach for organizations to be more effective in adopting a KMS.

Secondly, the results obtained imply that knowledge sharing plays an important role when it comes to enhancing the organizational learning of firms, even though the degree of relevance of each category of knowledge sharing approach differs. The results indicate that there is sufficient evidence to support a positive relationship between knowledge sharing and organizational learning. This result concurs with that of (Rangachari, 2010), in which he incorporates organizational learning knowledge networks theories to generate a theoretical framework for understanding the process of successful knowledge sharing networks; that is, networks mainly helpful to progress and learning. Sorenson (2003) confirms in his study that through knowledge sharing, organizational learning could be achievable. While knowledge-sharing processes may undeniably present increased substantive benefits leading to KMS adoption, the main challenge

for respondents was that current organizational culture does not encourage knowledge sharing. Hutchinson and Quintas (2008) emphasize that the biggest challenge for most KMS efforts lies in facilitating formal knowledge sharing activities in SMEs. Thus, enforcing a dominant sharing culture in SMEs is not an easy task during the KMS adoption process. Jordanian SMEs believe that knowledge is confidential and that making knowledge public will eventually harm the company's competitiveness and sustainability. Thus, despite the fact that spreading knowledge is crucial for the success of most of the IT adoption projects (Yee-Loong Chong and Ooi, 2008, Lin and Lee, 2005), the culture of many Jordanian SMEs do not support knowledge sharing. Many Jordanians still consider that knowledge is power in terms of respect, prestige and promotion and they are reluctant to share what they believe as a source of superiority with others. This was found to be consistent with the finding of Yee-Loong Chong, Ooi et al. (2014), which showed that the culture of many Malaysian SMEs does not encourage the notion of information sharing. This is also in parallel with a study by Lin and Lee (2005), in which they demonstrated that Taiwanese firms are unwilling to share knowledge as employees are discouraged from sharing knowledge because of their colleagues who will benefit at their expense.

Extant literature reports that a learning environment would promote creation, transfer, and implementation of knowledge to workplace routines and processes (Shipton et al., 2005). However, the findings from this study showed that in SMEs organizational learning had a positive effect on knowledge management capabilities and this demonstrates that the learning culture facilitates the creation and acquisition of new knowledge from knowledge exchange and experience. This imply that the learning culture has a crucial relationship with KM, as learning is the process of knowledge acquisition through knowledge exchange, knowledge utilization, and the maintenance of existing knowledge (Lee et al., 2012). This finding supports the arguments of (Lee et al., 2012), who suggest that culture which promotes and facilitates learning has a strong influence on the capabilities of knowledge creation, acquisition, transfer, and application (knowledge management capabilities). In line with the previous studies that present innovative learning as a predecessor of organizational performance, this study demonstrates that innovative organizational learning positively affects knowledge sharing. While (Lee and Choi, 2003) introduced organizational creativity as a predecessor for organizational performance, this study considers organizational creativity as part of organizational effectiveness, which is a concept of organizational performance and is a direct and ultimate effect of KMS adoption (Gold and Arvind Malhotra, 2001). The analytical results reveal significant associations between organizational learning and the level of KMS adoption. Usually, many authors challenge KM capabilities and organizational learning (Dasgupta and Gupta, 2009). Thus, authors' repeatedly fail to address the significance of organizational learning in this regard. This study is the first to consider organizational learning as an important variable that supports the notion of KMS adoption within Jordanian SMEs.

In this study, organizational culture did not facilitate SMEs' knowledge sharing activities. One possible explanation for the insignificant relationship between organizational culture and knowledge sharing is that knowledge sharing may be more influenced by factors other than cultural considerations. Contrary to the expectation, this study found that organizational culture does not significantly influence knowledge sharing. Hutchinson and Quintas (2008) argue that the biggest challenge for most KM efforts lies in facilitating formal knowledge sharing activities

in SMEs. Similarly, McDermott and O'Dell (2001) suggest that to overcome this obstacle, organizations should incorporate their KMS projects into their culture. However, they found that organizational culture is still stronger than their devotion to KMS projects. Consequently, KMS projects should not be seen as a predecessor to organizational culture. Organizational culture has the potential to both enable knowledge flows and, simultaneously, allow an SME to increase trust among employees. Additionally, the result of this study shows that organizational culture did not have a significant impact on KMS adoption in SMEs. This finding contradicts the arguments of DeTienne et al. (2004), who suggest that organizational culture is crucial for SMEs in introducing new successful KMS projects. Similarly, Moffett, Mcadam et al. (2003), in their study, found that encouraging the adoption of KMS within an organization is important in creating a culture of confidence and trust. Organizational culture helps the organization in creating a healthy environment for effective KMS adoption. SMEs should rapidly respond to changes in the competitive environment by altering their organizational culture to modify the organizational behaviour, and thus, may consider a KMS necessary to constantly expand the capacity of improvement (Mcdermott and O'dell, 2001).

The results of the study show that IT capability has an important role in knowledge management capabilities. This supports the results from previous studies that the reliance of KM capabilities on IT improves the possibility of knowledge creation, transfer, and application (Alavi and Leidner, 2001). IT supports knowledge acquisition/creation, knowledge dissemination, and knowledge utilization (Jayasingam et al., 2013). These practices demonstrate the use of knowledge as the central factor for adding value (Pérez-López and Alegre, 2012). IT capability has a strong effect on KM capabilities as it plays a critical role in the process of knowledge sharing and is a vital element in KM (Argote and Miron-Spektor, 2011). The study results support the notion of previous studies that IT enhances KM capabilities (Leung, 2010). Additionally, the results of the study are consistent with the research findings of Alavi and Leidner (2001), which indicate that IT boosts knowledge sharing by providing knowledge access reach through new channels of communication. Also, Riege (2005) indicates in his study that IT provides large amounts of information, which is made accessible to users within the organization. SMEs would therefore gain better knowledge sharing practices in the organization from the adoption of functional IT application. Previous studies recommended that to achieve a significant influence on knowledge transfer and exchange knowledge more successfully, SMEs must effectively demonstrate the use of IT capability (Nurach et al., 2012). SMEs with greater IT capability are thus more likely to achieve sustainable growth and pursue KM best practices (Nurach et al., 2012, Ling, 2011). The study also found that IT capability appears to a large extent as the dominant factor in an SME's KMS adoption decisions (Dotsika and Patrick, 2013). In the SME literature, IT is often considered as an essential KM infrastructural capability, encouraging KMS adoption activities. SMEs that possess more IT capability seem to have a better opportunity in implementing KMS. SMEs must provide IT capability to guarantee that KM is adopted effectively. This implies that SMEs need to have IT resources prepared as they set up to pursue the KMS adoption process. Thus, greater familiarity with IT infers a higher level of knowledge to use in the operation of newer KM systems.

## 7 Implications for research

The research results, in general, support the hypotheses developed based on the proposed research model, with only a few exceptions. However, the study makes significant contributions

to the body of research on the adoption of KM systems. Traditionally, researchers have recommended more integrated approaches that share more than one theoretical perspective to understand the IT adoption phenomenon involving new technological adoption (Oliveira and Martins, 2011). The research model of this study was formulated to investigate the impact of KM capabilities, knowledge sharing, organizational learning, organizational culture and IT capability on the adoption of KMS in the Jordanian SME context. The research model and the instrument used in the research offer a solid basis for understanding the elements of the KMS adoption process since the instrument used in this research was verified for reliability, validity, and discriminant tests. It is therefore justified to emphasize that the model and the instrument can be implemented in new technological adoption studies. The study used SEM, which is a statistically powerful technique that requires a sample of considerable size to attain good rates of adhesion. In addition, structural equation modeling can be used to analyze complex relationships between one or more independent variables and one or more dependent variables (Yang et al., 2012). Therefore, the study addresses the research gap between the factors facilitating KMS and its adoption by organizations that have been recognized by other researchers as requiring further investigation (Wang and Lai, 2014, Xu and Quaddus, 2012, Lin, 2013). As the results show, the effectiveness of the proposed model is potentially a theoretical framework for investigating different kind of technological adoption in SMEs. The results of this study have several key implications for KMS adoption in SMEs in a developing country context. First, the proposed model is considered comprehensive, since it encompasses different factors that impact KMS adoption. The results also indicate the significant explanatory power of this model with regard to KM capabilities, knowledge sharing, organizational learning, organizational culture and IT capability. From this perspective, the research results contribute to the current understanding of KMS adoption in Jordan by simultaneously examining the relative importance of these dimensions, which have not been specifically addressed in previous studies in this context.

All the constructs influencing KMS adoption had significant direct effects, except for organizational culture. These findings extend those of previous IS and KMS studies that adopted the similar perspectives by further presenting the significance of KM capabilities, knowledge sharing, organizational learning and IT capability in interpreting the managers' perceptions of KMS adoption in Jordan. Future KMS studies that adopt similar approaches in similar contexts should thus incorporate these factors in their research frameworks. Although previous research has investigated many factors that were found to be significantly influential and thus improve the adoption activities of KMS in organizations (Nevo and Chan, 2007, Benbya and Belbaly, 2005), few studies have empirically investigated these effects in SMEs (Wong and Aspinwall, 2004, Dotsika and Patrick, 2013). In summary, a few studies were found in the KMS literature to investigate factors from a multidimensional perspective to empirically examine the effect of multiple variables on KMS adoption. Thus, the study addresses this research gap by developing and empirically validating a research model of KMS adoption from a different perspective. Therefore, the findings of this study are believed to contribute by providing significant insights into a more effective KMS adoption process from a more comprehensive and integrated viewpoint.

## 8 Limitations and scope for further research

Although our study provides some significant findings, it still faces some limitations that should be recognized and can be improved in future studies. The use of cross-sectional data to draw

conclusions in this study cannot be used as the proof of the causal relationships but rather these can simply be inferred. The time sequence of the relationship between the independent and dependent variables could not be identified. By performing a longitudinal study, future research can examine the research model in a different time sequence and make comparisons, thus providing better insight into the KMS adoption process. Third, as was evident from prior parts of the study, KM capabilities, knowledge sharing, organizational learning, organizational culture and IT capability were included in this research. However, there are other factors that may influence KMS adoption. Finally, the sample was drawn from Jordanian managers of SMEs. Hence, the research model should be examined further using samples from other countries, since the findings may be influenced by cultural differences between Jordan and other countries. Thus, further examination would offer a more effective investigation of the determinants because of cultural differences that may exist. Furthermore, the number of responses obtained from the survey was rather small. However, this was expected since KM is a new and promising field, and not that many SMEs have begun the process of adopting KMSs effectively. It was apparent when the survey was performed, not that many SMEs were willing to participate in the survey. A larger number of responses would probably have resulted in a more accurate finding, and thus, future research could replicate this study, with the hope that more SMEs have adopted KMS and gained more insight and experience in this field. Additionally, this study should be verified via a larger sample to increase its generalization.



## 9 Conclusions

The empirical analysis of this study shows important factors influencing the KMS adoption process, and presents their differential effects on this process. The result confirms that KM capabilities, knowledge sharing, organizational learning and IT capability have a preferable influence on the adoption of KMS among Jordanian SMEs. On the other hand, regarding organizational culture it was found that the SMEs do not find culture as influential as it should be and hence, these SMEs are not willing to share knowledge using a KM system. Similarly, organizational culture was found to be insignificant in terms of KMS adoption. The results of this research can help SMEs who intend to obtain a higher level of KMS adoption by paying close attention to the research variables to find out how they fare in terms of these variables since they are crucial in the adoption process of KMS. Although this research was conducted in Jordanian SMEs, its results will be valid to different SMEs in various countries across the region and the globe because of its generic approach. Although previous research has suggested the existence of significant challenges facing KMS adoption, few studies have empirically examined these effects in SMEs (Wong and Aspinwall, 2004, Dotsika and Patrick, 2013). To the best of our knowledge, this study is the first study to theoretically specify or empirically test the determinants of KMS adoption in SMEs by a different perspective. Thus, the model can be taken as a research model for further investigation.

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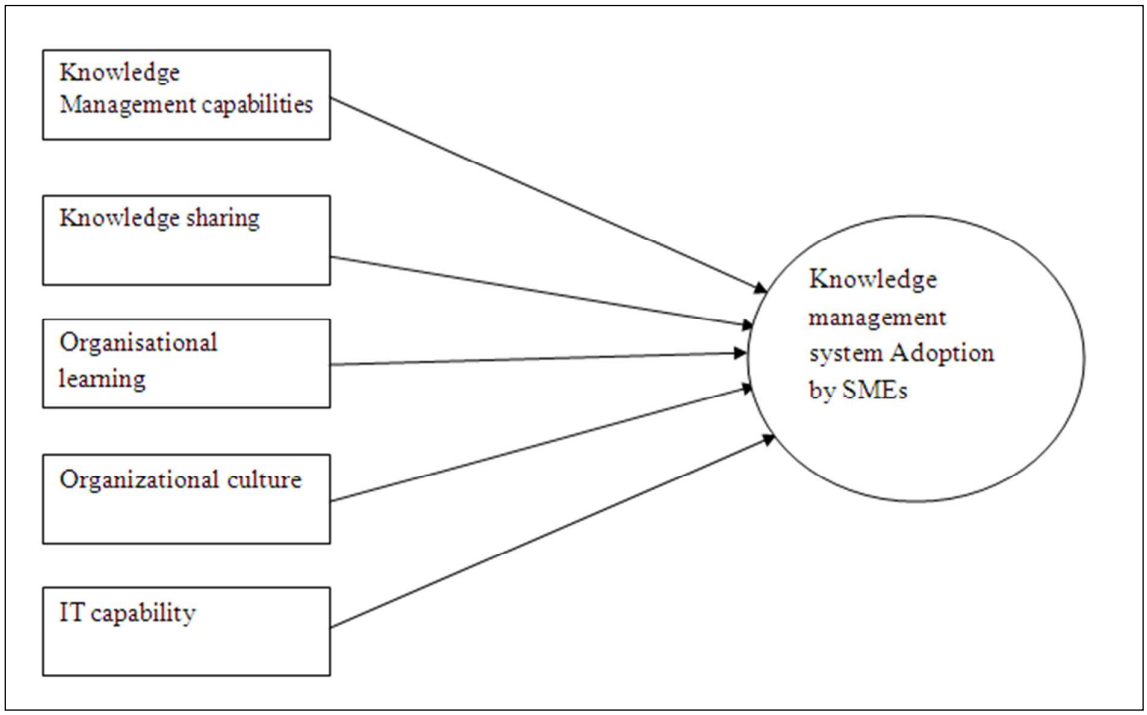


Fig. 1 the research framework

| Table 1. | | | | | |
|---|---|---|---|---|---|
| **Reliability Validation for Latent Constructs.** | | | | | |
| **Overview** | **Ave** | **Composite reliability** | **Cronbach's alpha** | **R square** | **LV index values** |
| **Knowledge Management Capabilities** | 0.762 | 0.891 | 0.821 | 0.381 | 3.93 |
| **Knowledge Sharing** | 0.738 | 0.825 | 0.769 | 0.482 | 3.98 |
| **Organizational Learning** | 0.646 | 0.914 | 0.886 | 0.243 | 4.34 |
| **Organizational Culture** | 0.806 | 0.927 | 0.825 | 0.427 | 3.89 |
| **IT Capability** | 0.758 | 0.883 | 0.906 | 0.485 | 4.08 |
| **Knowledge Management System Adoption** | 0.784 | 0.859 | 0.782 | 0.488 | 4.44 |

**Table 2.**

**Item loading for indicators of latent constructs.**

| Construct | Item definition | Loadings | Ave | Composite reliability | Cronbach's alpha | R square |
|---|---|---|---|---|---|---|
| **Knowledge Management System Adoption** | Knowledge sharing | 0.7960 | 0.784 | 0.859 | 0.782 | 0.488 |
| | Organizational learning | 0.8742 | | | | |
| | IT capability | 0.7953 | | | | |
| **Knowledge Management Capabilities** | Knowledge acquisition: The need to obtain knowledge and its sources | 0.8254 | 0.762 | 0.891 | 0.821 | 0.381 |
| | Knowledge conversion: The need to change the state or format of knowledge for its reuse | 0.8674 | | | | |
| | Knowledge application: The need to transfer and use knowledge for realization of its values | 0.8043 | | | | |
| | Knowledge protection: The need to exclusively protect knowledge | 0.8247 | | | | |
| **Knowledge Sharing** | Knowledge sharing enhance the process of decision making | 0.7835 | 0.738 | 0.825 | 0.769 | 0.482 |
| | Knowledge sharing support innovation and creativity | 0.7033 | | | | |
| | Knowledge sharing considered as a way of gaining competitiveness | 0.7913 | | | | |
| | Knowledge sharing promote collaboration in the organization | 0.7923 | | | | |
| **Organizational Learning** | The knowledge acquired from KMS enables the questioning of our view on the current business practices | 0.8240 | 0.646 | 0.914 | 0.886 | 0.243 |
| | The knowledge acquired from KMS enables the development of our creativeness | 0.8099 | | | | |
| | The knowledge acquired from KMS improves our perspectives on the execution of business processes | 0.8586 | | | | |
| | The knowledge acquired from KMS enables having views in new direction | 0.8175 | | | | |
| | The knowledge acquired from KMS broadens our views on business practices | 0.7365 | | | | |
| **Organizational Culture** | The organization ability to alter the behavior of the employees | 0.7494 | 0.806 | 0.927 | 0.825 | 0.427 |
| | Beliefs, values and expectations are held constantly by the members of the organization | 0.7958 | | | | |
| | Organization members participation in decision making | 0.7533 | | | | |
| | The vision of the organization Members about the organization purpose | 0.8339 | | | | |
| **IT Capability** | Technological IT resources (Infrastructure, business applications). | 0.9184 | 0.758 | 0.883 | 0.906 | 0.485 |
| | Human IT resources (technical IT skills, managerial IT skills) | 0.8587 | | | | |
| | Database management system (DBMS) was used to support KM practice. | 0.8863 | | | | |

**Table 3: Item-to-construct correlation vs. correlations with other constructs.**

| Construct | Item definition | Knowledge Management Capabilities | Knowledge Sharing | Organizational Learning | Organizational Culture | IT Capability | Knowledge Management System Adoption |
|---|---|---|---|---|---|---|---|
| **Knowledge Management Capabilities** KMC 1 | Knowledge acquisition: The need to obtain knowledge and its sources | **0.8254** | 0.4921 | 0.5640 | 0.4012 | 0.3115 | 0.3945 |
| KMC 2 | Knowledge conversion: The need to change the state or format of knowledge for its reuse | **0.8674** | 0.4921 | 0.4671 | 0.3015 | 0.2480 | 0.2932 |
| KMC 3 | Knowledge application: The need to transfer and use knowledge for realization of its values | **0.8043** | 0.3799 | 0.3881 | 0.3676 | 0.2480 | 0.2812 |
| KMC 4 | Knowledge protection: The need to exclusively protect knowledge | **0.8247** | 0.3138 | 0.3584 | 0.2574 | 0.1481 | 0.3090 |
| **Knowledge Sharing** KS1 | Knowledge sharing enhance the process of decision making | 0.2356 | **0.7835** | 0.3866 | 0.3760 | 0.3959 | 0.5082 |
| KS2 | Knowledge sharing support innovation and creativity | 0.5721 | **0.7033** | 0.5478 | 0.4598 | 0.3122 | 0.3335 |
| KS3 | Knowledge sharing considered as a way of gaining competitiveness | 0.4453 | **0.7913** | 0.5466 | 0.4195 | 0.2553 | 0.4829 |
| KS4 | Knowledge sharing promote collaboration in the organization | 0.2444 | **0.6923** | 0.4530 | 0.3811 | 0.3686 | 0.5503 |
| **Organizational Learning** OL1 | The knowledge acquired from KMS enables the questioning of our view on the current business practices | 0.4661 | 0.5242 | **0.8240** | 0.4755 | 0.3799 | 0.4574 |
| OL 2 | The knowledge acquired from KMS enables the development of our creativeness | 0.4811 | 0.4574 | **0.8099** | 0.3943 | 0.3243 | 0.4431 |
| OL 3 | The knowledge acquired from KMS improves our perspectives on the execution of business processes | 0.4881 | 0.5585 | **0.8686** | 0.4494 | 0.4909 | 0.4718 |
| OL 4 | The knowledge acquired from KMS enables having views in new direction | 0.5826 | 0.5727 | **0.8175** | 0.5214 | 0.4626 | 0.5034 |
| OL 5 | The knowledge acquired from KMS broadens our views on business practices | 0.3552 | 0.4845 | **0.7365** | 0.3634 | 0.2492 | 0.3826 |
| **Organizational Culture** OCL1 | The management of our organization expects everyone to actively contribute to the registration and transmission of knowledge. | 0.2933 | 0.4588 | 0.3923 | **0.7494** | 0.0294 | 0.2637 |
| OCL2 | Interaction between different departments is encouraged in this organization. | 0.3488 | 0.4556 | 0.3325 | **0.7958** | 0.3267 | 0.3406 |
| OCL3 | The goals and vision of this organization are clearly communicated to the employees. | 0.3343 | 0.4141 | 0.3887 | **0.7533** | 0.3597 | 0.2034 |
| OCL4 | The management of this organization stresses the importance of knowledge to the success of the organization | 0.4471 | 0.4693 | 0.5471 | **0.8339** | 0.5082 | 0.3842 |
| **IT Capability** ITC1 | IT in our company provides environments which enable cooperative working in anytime and anyplace | 0.1481 | 0.4040 | 0.4237 | 0.4686 | **0.9184** | 0.4240 |
| IT C2 | IT in our company provides environments which enable fast and easy exchange of opinions among organizational members | 0.2256 | 0.3801 | 0. 3383 | 0.3413 | **0.8587** | 0.3768 |
| IT C3 | IT in our company supports fast and easy access to necessary information and knowledge | 0.2207 | 0. 3551 | 0.4264 | 0.4566 | **0.8863** | 0.4746 |
| **Knowledge Management System Adoption** | sharing and collaboration | 0.3073 | 0. 5582 | 0.4188 | 0.3679 | 0.2701 | **0.7960** |
| | Information Quality | 0.4690 | 0.5957 | 0.4648 | 0.2783 | 0.3997 | **0.8742** |
| | IT capability | 0.3320 | 0.4354 | 0.2918 | 0.3948 | 0.4690 | **0.8095** |

| Table 4. | | | | | | |
|---|---|---|---|---|---|---|
| **Reliability and inter-construct correlations for reflective scales.** | | | | | | |
| **LV construct** | **Knowledge Management Capabilities** | **Knowledge Sharing** | **Organizational Learning** | **Organizational Culture** | **IT Capability** | **Knowledge Management System Adoption** |
| **Knowledge Management Capabilities** | **0.836** | | | | | |
| **Knowledge Sharing** | 0.476 | **0.873** | | | | |
| **Organizational Learning** | 0.594 | 0.623 | **0.852** | | | |
| **Organizational Culture** | 0.351 | 0.546 | 0.450 | **0.738** | | |
| **IT Capability** | 0.492 | 0.622 | 0.493 | 0.533 | **0.814** | |
| **Knowledge Management System Adoption** | 0.454 | 0.544 | 0.685 | 0.568 | 0.435 | **0.812** |

Table 5.

**Summary of hypotheses tests (path coefficients and hypotheses testing).**

| Significance values | $p < 0.1$ | 1.645 | | | |
|---|---|---|---|---|---|
| | $p < 0.05$ | 1.965 | | | |
| | $p < 0.01$ | 2.586 | | | |
| Hypothesis No. | Hypothesis (direction) | Path coefficient | T-value | Significance (tow-tailed) | Supported? |
| H1 | KM capabilities → Knowledge sharing | 0.184 | 2.825 | $p < 0.01$ | Yes |
| H2 | KM capabilities → Organizational learning | 0.189 | 2.652 | $p < 0.01$ | Yes |
| H3 | KM capabilities → KMS adoption | 0.294 | 3.865 | $p < 0.05$ | Yes |
| H4 | Knowledge sharing → Organizational learning | 0.288 | 4.058 | $p < 0.01$ | Yes |
| H5 | Knowledge sharing → KMS adoption | 0.453 | 5.026 | $p < 0.01$ | Yes |
| H6 | Organizational learning → KM capabilities | 0.496 | 7.242 | $p < 0.01$ | Yes |
| H7 | Organizational learning → Knowledge sharing | 0.488 | 6.663 | $p < 0.01$ | Yes |
| H8 | Organizational learning → KMS adoption | 0.364 | 6.383 | $p < 0.01$ | Yes |
| H9 | Organizational culture → Knowledge sharing | 0.135 | 1.547 | n.s. | No |
| H10 | Organizational culture → KMS adoption | 0.128 | 0.545 | n.s. | No |
| H11 | IT capability → KM capabilities | 0. 054 | 0.864 | n.s. | No |
| H12 | IT capability → Knowledge sharing | 0.068 | 3.014 | $p < 0.05$ | Yes |
| H13 | IT capability → KMS adoption | 0.218 | 3.982 | $p < 0.01$ | Yes |
| Significance values | $p < 0.1$ | 1.645 | | | |
| | $p < 0.05$ | 1.965 | | | |
| | $p < 0.01$ | 2.586 | | | |