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Investigating the success of knowledge management: An empirical study of small- and medium-sized enterprises

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ABSTRACT

Most firms have started to realize the importance of KM in streamlining their operations and processes to improve organizational performance. So in this paper, we try to survey and present a model for measuring success of KM in small- and medium-sized enterprises (SMEs). This study is the first empirical test of an adaption of the Jennex and Olfman (J&O) KM success model considered a better description of KM success due to its strong theoretical grounding to analysis the influences of KM and inter-actions on workers' productivity in Taiwanese SMEs settings. Structural equation modeling techniques are applied to data collected through questionnaires from 277 knowledge workers. All the hypothesized relationships between the variables are significantly supported by the data. The findings served as useful reference points for researchers interested in investigating issues related to the successful implementation of KM, and for practitioners aiming to achieve the benefits of KM in SMEs.

1. Introduction

In Taiwan, small- and medium-sized enterprises (SMEs) exert a strong influence and constitute approximately 97.63% of all enterprises and make up 77.12% of the Island's overall employment. In the face of the volatility and rate of change in business environments, SMEs are facing the unprecedented challenges brought about by the knowledge economy and to continue to retain flexibility and innovation is actually a vital topic. KM has become a critical component for maintaining competitive advantages and many organizations are exploring the field of KM in order to improve and sustain their competitiveness. Faced with competitive dilemmas may be solved by the implementation of KM to enhance competitiveness. That is, KM has the potential to make SMEs more competitive and innovative and the ability of KM to lead to sustainable performance is even more critical. Such as Friedman and Prusak (2008) noted that KM can be used to improve both individual and organizational performance, and has become a critical issue in industrial practices. Okunoye and Karsten (2002) stated that KM has indeed become the underlying sources for successful organizations regardless of their size and geographical locations. KM has now become a widely spread business discipline, it is no longer the concern of just large organizations. As asserted by Frey (2001), although major corporations have led the way in introducing and implementing KM, it is increasingly important for SMEs to manage their collective intellect.

Information systems success is one of the most widely used dependent variables in information systems research. Measuring the success of systems is critical to understand the value, effect of management operations and investment on them (DeLone & McLean, 2003). Therefore, since 1992, several studies have been examined the success of different information systems and measured it experimentally (Lee & Lee, 2009; Lin & Shao, 2000; Muylle, Moenaert, & Despontin, 2004; Wang, Wang, & Shee, 2007). However, few studies have concentrated on measuring KM success. As Kulkarni, Ravindran, and Freeze (2006–2007) note, there has been a lack of adequate theoretical modeling and empirical examination of factors leading to KM success. Markus (2001) has also indicated that getting employees to use KMSs effectively to improve organization performance is still a central issue for both researchers and practitioners. In proposing a success model of KM and empirically investigating multidimensional relationships among success measures, this study is based on the Jennex and Olfman (J&O) model (2005) and Kulkarni et al.'s (2006–2007) KM success model. The J&O model is based on several case studies and quantitative research studies and is

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theoretically grounded on the DeLone and McLean IS Success Model, which has been accepted for several years and has been validated by several studies, applied within the KM context. Although KM have been widely implemented in organizations, their availability does not guarantee that employees will be willing to spend time and effort to use them. Measuring KM success is therefore crucial for providing a basis on which companies can evaluate KM, stimulating management to focus on critical aspects of the business, and justifying investments in KM activities. The measurement of KM success is also valuable for building and implementing efficient KM initiatives and systems from the perspectives of KM practitioners (Jennex & Olfman, 2005).

SMEs need to respond rapidly to these emerging changes to fulfill their customer needs more rapidly. In order to further utilize KM for seamless business operations and decision-making, adoption of KM in SMEs has become the emerging agenda in developing business strategies. To manage knowledge resources is considered the main objective of pursuing KM in business operations in Taiwanese SMEs. However, most studies of KM implementation have been heavily focused on large companies. As such, existing research findings are mainly large companies oriented, thereby reflecting their situations. SMEs face unique KM challenges that are distinct from those of their larger business. Directly applying these results into the SMEs environment may not be sufficient without an understanding of their very own and specific conditions. Previous studies fall short of studying and identifying the adoption of KM from the SMEs perspective. They have not considered the differences of company size as well as the specific features of SMEs that could affect KM. Even, in recent years, many researchers have been focusing on the development of practical implementation of KM in SMEs (Chan & Chao, 2008; Denning, 2006; Handzic, 2004; Tseng, 2007). There are issues existing where SMEs fail to realize and recognize the potential benefits of KM. A better understanding of the adoption for implementing KM in SMEs is needed in order to ensure the success of their efforts. Such as Jennex, Smolnik, and Croasdell (2008) noted, to assess the benefits of implementing KM and its status of KM readiness within an organization's practices is an important issue that requires further exploration. In spite of KM importance for sustainable competitiveness, in most SMEs there is an absence of systematic KM (Wong & Aspinwall, 2005).

In spite of the vast literature on KM, there has been little or no empirical evidence for Taiwanese SMEs. Due to SMEs have some unique features (limited financial and human resources, flat structure, informal managerial styles, centralized decision-making, focus on the day-to-day business operations) that deeply influence the way they can approach KM. In the context of SMEs, a field where research on KM is still fragmented and quite limited (Durst & Edvardsson, 2012). Hence, this research attempts to propose a success model for KM and to empirically investigate the multi-dimensional relationships among the success measures based on KM success model for Taiwanese SMEs. In order to understand KM practices in SMEs, do we need a new concept of KM and new interpretive frameworks that are different from those normally adopted in the case of large firms? We examine the following research questions: (1) What are the influences of system quality, knowledge quality, and service quality on KM use in SMEs setting? (2) What are the individual and combined influences of system quality, knowledge quality, and service quality on user satisfaction in SMEs setting? (3) What is the effect of KM use on user satisfaction in SMEs setting? (4) What is the individual and combined influences of KM use and user satisfaction on net benefits in SMEs setting? A potential contribution of this study focuses on the less explored SMEs in Taiwan context and provides some insight for companies that are not sure how to implement KM into their business operations, further take the necessary action based on these assessments.

2. Theoretical background

2.1. Knowledge management in SMEs

KM is becoming a growing concern in management research and practice because of its role in determining firm innovation capability and in enhancing working life quality of knowledge workers. KM may be particularly relevant for SMEs. SMEs tend to be relatively more dynamic and agile than larger organizations, and more ready to learn. How to effectively establish and sustain good KM practices in SMEs in order to ensure their competitiveness is important. KM refers to managing the corporation's knowledge by means of a systematic and organizational specified process for acquiring, organizing, sustaining, applying, sharing and renewing both tacit and explicit knowledge by employees to enhance organization performance and create value (Davenport & Prusak, 1998). Tiwana (2001) claims that 'KM can be extended to management of organizational knowledge for creating business value and generating a competitive advantage', 'KM enables the creation, communication, and application of knowledge of all kinds to achieve business goals', 'KM is the ability to create and retain greater value from core business competencies'. KMS supports the use of information through knowledge acquisition, knowledge sharing and knowledge application for improvement. This captured knowledge is then stored in knowledge repositories to be shared between individuals and departments. Subsequently, the knowledge is applied in business situations, and introduces other ideas and frames of reference to ultimately create new knowledge. As new knowledge is created, it needs to be captured and stored, shared and applied, and the cycle continues KM practices are applied to help the organization strengthen its competitive advantage, and assist knowledge workers to leverage their skills and their ability to offer business value. Therefore, KM is the process through which an organization uses its collective intelligence to accomplish its strategic objectives. KM process should start by recognizing and identifying the knowledge to be captured, shared and applied, to enable the organization and its workforce to achieve a sustainable and competitive advantage.

In fact, KM can provide several benefits to SMEs, such as better communication, improved customer service, faster response times, enhanced innovativeness, greater efficiency in processes and procedures, and reduced risk of loss of critical capabilities (Edvardsson & Durst, 2013). In this regard, Dotsika and Patrick (2013) underline that the implementation of KM initiatives in SMEs may be even more crucial, as knowledge can be their single key resource. For Taiwanese SMEs, they have to rely on their own ability to improve products and processes, providing customers with value-adding innovations and learning capabilities. Due to resource constraints, SMEs are particularly required to absorb knowledge from external sources (Durst & Edvardsson, 2012). KM can provide quick and easy access to external sources of knowledge and new and more intense communication channels with partner organizations. Furthermore, it can erase traditional constraints on SMEs innovation ability, while leveraging their flexibility and responsiveness.

2.2. KM success models

A stream of research has been conducted to identify IS success measures. DeLone and McLean (2003) introduced a comprehensive taxonomy in order to organize this diverse research. The DeLone and McLean (D&M) IS success model is based on the review and integration of 180 research studies that used some form of system success as a dependent variable. The model identifies six

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interrelated dimensions of success, each of which has its own measures for determining impact on success and other dimensions. The key focus of the model is the relationships, and it demonstrates that the system and information quality aspects of a system lead to increased system use and user satisfaction. Information quality is based on the use of accurate data, whereas system quality is based on the technical infrastructure and interface involved. User satisfaction tends to increase use, whereas use tends to lead to some level of user satisfaction, making these dimensions difficult to separate. System use leads to system success. DeLone and McLean (2003) subsequently revisited the D&M IS success model by incorporating subsequent IS success research and addressing criticisms of the original model. One hundred and forty-four articles from refereed journals and fifteen papers from the International Conference on Information Systems (ICIS), citing the D&M IS success model, were reviewed, with fourteen of these articles reporting on studies that empirically investigated the model. The result of this revision was the modified D&M IS success model. Major changes include the addition of a service quality dimension, to address services provided by the IS groups, the modification of the use dimension into a use/intent to use dimension, and the combination of the individual and organizational impact dimensions into an overall net benefits dimension. The modification of the use variable to include intent to use is important for this paper.

Jennex and Olfman (2003) devised a KMS success model that is based on the D&M IS success model. KMSs involve IT-based systems that have been developed to support and enhance the processes of knowledge creation, storage/retrieval, transfer, and application. KMS success can be defined as making KMS components more effective by improving their search speed and accuracy, among other qualities. KMSs that enhance search and retrieval functions enhance decision-making effectiveness by improving the ability of the decision maker to find and retrieve appropriate knowledge in a more timely manner. In other words, enhancing KMS effectiveness makes KMSs more successful, in addition to being a reflection of KM success. This implies that by increasing KMS effectiveness, KMS success and decision-making capability are enhanced, thereby positively influencing organizations. KM success is crucial for understanding how initiatives and systems should be designed and implemented. Previous literature offers a number of perspectives on KM success. The J&O (2006) KM success model, based on the D&M (2003) IS success model, combines KM and KMS success. Therefore, in this study, we consider KM and KMS success to be interchangeable and use the term KM to refer to both KM and KMS, and the term success to refer to both success and effectiveness.

KM is complex and multi-faceted concepts. As suggested by Kulkarni et al. (2006–2007), a KM success model needs to cover the effects of all the different types of KM activities that may be involved. A more comprehensive view of KM must include the specific processes required to acquire, store, retrieve, and apply knowledge (Gold, Malhotra, & Segars, 2001). As such, KM success can be defined as capturing the right knowledge, getting the right knowledge to the right user, and using this knowledge to improve individual performance. Considering the many view of KM, in this paper the definition of "KM success" means that the organization's employees manage and use the knowledge lead to the organization's benefits (such as better decision-making, faster response time to key issues, increasing productivity and job effectiveness, sharing best practice etc.) or KM could provide the appropriate knowledge to those that need it when it is needed.

2.3. Related work

Although KM is becoming a growing concern in management research and practice, we lack an understanding of how firms create knowledge and how this is translated into competitive advantages or enhanced customer relations (Edvardsson & Oskarsson, 2011). Numerous works on KM are reported in literature. The main focus of KM research to date has been on processes and structures within large organizations in order to improve their performance and competitive standing. In this section, we discuss the related work in KM. Organizations have long acknowledged that KM is an important mechanism for gaining competitive advantages and improving performance. KM issues attracted significant number of research to examine whether KM really works in the organizations and the success factors. Most of the literature on KM and its application has, until recently, been centered on large organizations. Pertinent issues in small businesses have to a large extent been neglected. However, small businesses do not necessarily share the same characteristics and ideals as large ones. There are certain unique features of SMEs that need to be understood before KM is implemented in their environment. To date KM in SMEs have been discussed in many empirical studies, but KM is rarely studied in Taiwanese SMEs setting. KM, especially in SMEs setting, has not yet been fully explored. Table 1 shows the brief looks at the current body of studies related to KM in SMEs setting. More papers were published after 2011, indicating a growing interest in the subject. However, the small number of papers clearly indicates serious lack of knowledge in this field of study.

To sum up, most of the literature on KM and its application has, until recently, been centered on large organizations. The literature that examines KM in the context of SMEs is still scarce and provides fragmented insights (Durst & Edvardsson, 2012; Dwivedi, Venkitachalam, Sharif, Al-Karaghouli, & Weerakkody, 2011; Ribière & Christian, 2013). Relevant issues in SMEs have to a large extent been neglected. Such as Durst and Edvardsson (2012) stressed that the body of research about KM in SMEs is rather limited compared to the large number of studies concerning big companies. In light of this, the paper aims to redress some of this imbalance in the literature by putting KM into the context of SMEs.

3. Research methodology

3.1. Research model

In order to present a model for measuring KM success, a comprehensive model is presented for measuring the success of KM. Because KM systems are kinds of information systems and workers use them for working. But the revised D&M model, in spite of all its strengths, still has defects. In this paper, we formulate our theoretical framework basing on J&O (2005) conceptualization of KM success model, adapted to socio-technical view. From the socio-technical perspective, measures of success should combine both technological and human elements (Garrity & Sanders, 1998; Skok & Kalmanovitch, 2005). Within the KM context, J&O (2005) KM success model is a multi-dimensional model, whose interrelated dimensions are based on the work of DeLone and McLean (2003). The revised KM success model is shown in Fig. 1. According to Fig. 1, all components of the widely used model D&M, are included in this conceptual model to measure the success of KM. Also, a new relationship between intention to use and system use components is added to the previous D&M model.

3.2. Research hypotheses

Initially, KMSs are implemented and subsequently, various degrees of system, information, and service quality are examined. Knowledge workers experience these quality dimensions by using KMSs in making decisions and conducting work. The three quality

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Table 1
Recent studies on KM in SMEs context.

Source	Key points	Subject	Findings
Wong and Aspinwall (2004)	To Look at their characteristics, their advantages and disadvantages, their strengths and weaknesses, and their key problems and issues, all associated with KM.	To redress some of this imbalance in the literature by putting KM into the context of small businesses.	Recognition of all these elements is crucial in order to provide a well-suited KM approach for small businesses.
Wong and Aspinwall (2005)	The perceptions of companies and a group of academics, consultants and practitioners. To investigate the CSFs for adopting KM in SMEs.	UK SMEs.	A total of 11 factors, comprising 66 elements were considered in the survey instrument.
Salojärvi, Furu, and Sveiby (2005)	Examining the relationship between sustainable sales growth and knowledge management activities.	108 Finnish and thematic interviews with 10 companies.	Higher levels of KM-Maturity were found to correlate positively with long-term sustainable growth.
Gray (2006)	To explore SME capacity to absorb and manage knowledge as a prior condition to the successful adoption of innovations and entrepreneurial growth.	1500 SME owners across regular quarterly SERTeam surveys and from other large scale studies.	There were significant age, educational and size effects that influence SME acquisition and assimilation of knowledge.
Edvardsson (2006)	To expand our knowledge on KM in SME (focusing on Icelandic SMEs).	Questionnaire sent to the Chief Executive of Icelandic SMEs.	Icelandic firms rely on an unsystematic manner of sharing and utilizing knowledge, few have a KM strategy and they mainly use unsophisticated ICT technologies. Those who had KM reported many benefits, such as improved decision making, better customer handling, improved staff retention and increased competitive advantage.
Valkokari and Helander (2007)	Integrating business network and KM to bridge the KM and strategic business network.	Literature review and analysis.	Provides a typology of the strategic SME network types and their key KM challenges based on a synthesis of existing literature. SME network typology presented can be used by managers of SMEs in evaluating their current KM practices level.
Supyuenyong, Islam, and Kulkarni (2009)	To understand how the special characteristics of SMEs influence their KM processes. KM process from capture of knowledge to its eventual reuse.	Four SMEs in Thailand.	Ownership and management structure as well as culture and behavior characteristics of SMEs seem to have a more positive effect than other SMEs characteristics on KM processes.
Edvardsson (2009)	To examine whether the popularity of KM in SMEs in Iceland has decreased or declined since 2004.	Questionnaire sent to the Chief Executive of Icelandic SMEs (2007), repetition of a previous survey (2004).	KM is not losing ground among SMEs in Iceland in 2004–2007. Many more firms have no KM strategy than in 2004. Those who had KM reported many benefits, such as improved decision making, better customer handling, improved staff retention and increased competitive advantage.
Migdadi (2009)	To develop a conceptual research model which comprises both CSFs and outcomes. Empirically assesses the relationships between CSFs and performance outcomes in SMEs.	25 SMEs in Saudi Arabia.	Study underlined the positive relationship between CSFS and KM outcomes (i.e., systematic knowledge activities, employee development, customer satisfaction, good external relationships and organizational success).
Steenkamp and Kashyap (2010)	To provide empirical evidence of SME managers' perceptions about the importance and contribution of intangible assets to their business.	Postal questionnaire sent to New Zealand SMEs.	Findings indicated that intangibles are important and are perceived as value drivers of business success. Customer satisfaction was ranked as the most important, followed by customer loyalty, corporate reputation, and product reputation.
Lee and Lan (2011)	To examine the infrastructure and process capabilities of Taiwanese SMEs To conducts a comparative analysis of KM in SMEs in Hong Kong.	SMEs in Taiwan in six sections.	A successful KM implementation depends on a harmonious amalgamation of infrastructure and process capabilities, including technology, culture and organizational structure.
Soon and Zainol (2011)	To examine the importance of the knowledge creation process, by looking at knowledge management enablers such as learning and T-shaped skills.	Questionnaire, 110 replies, Malaysia.	Learning and T-shaped skills are positively related to the knowledge creation process, enhancing organizational creativity and performance.

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Table 1 (*continued*)

Source	Key points	Subject	Findings
Wei, Choy, and Chew (2011)	To study the implementation of KM processes in Malaysian SMEs.	Questionnaire, 70 replies from SMEs owners/managers, Malaysia.	Some of the highest benefits of KM are related to innovation, improved decision-making processes, competitive advantage, efficiency and product/service quality.
Liao (2011)	To study the performance effects of interaction of KM with HRM control.	Survey among managers in computer and peripheral equipment manufacturing industries in Taiwan.	The findings show that firms emphasizing personalization strategy and HRM behavioral control have a better performance (growth rate, market share, profitability etc.). When codification strategy is used by firms, the combination with output based HRM will improve their performance. No single HRM system is related to firms combining strategies.
Capó-Vicedo, Mula, and Capó (2011)	To provide a social network model for improving KM in multi-level supply chains formed by SMEs.	Case studies among 10 construction firms in Spain.	The findings show how establishing these inter-organizational relationships between construction firms improves confidence, communication and team spirit. The result is a higher degree of innovation, fewer losses and improvement in efficiency and production.
Durst and Edvardsson (2012)	To review research on KM in SMEs to identify gaps in the current body of knowledge, which justify future research directions.	Literature review of 36-refereed empirical articles on KM.	The areas of KM are relatively well researched topics; whereas those of knowledge identification, knowledge storage/retention and knowledge utilization are poorly understood in the SME context.
Edvardsson and Durst (2013)	To identify what we know about the benefits of KM for SMEs. To propose an approach comprising a literature review in order to understand knowledge benefits for SMEs.	Literature review.	Highlight the benefits of knowledge management in the areas of employee development, innovation, customer satisfaction and organizational success. To identify nine empirical studies which fulfilled the selection criteria.

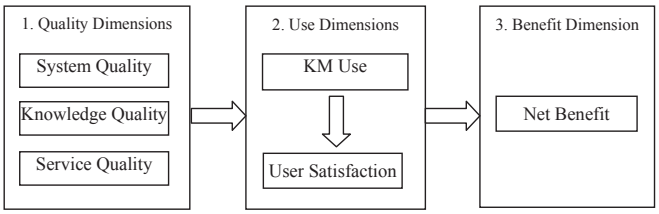

Fig. 1. Revised KM success model.

dimensions and the use of KMSs influence the individual value of using KMSs. The hypothesized relationships among the three quality dimensions, two use dimensions, and single benefit dimension is based on the theoretical and empirical work reported on by DeLone and McLean (2003), Jennex and Olfman (2005), and Kulkarni et al. (2006–2007). Based on the literature review and theoretical analysis, the hypothesized relationships can be described as follows:

(1) Quality dimensions and use dimensions

There is quite strong support in the literature both theoretical and empirical; the results indicated that system quality and information quality positively affected both system use and user satisfaction (DeLone & McLean, 1992, 2003; Rai, Lang, & Welker, 2002; Seddon & Kiew, 1996). KM system quality in our model is a measure of how well the KM systems support and enhance KM-related activities. In contrast to some prior studies that have operationalized IS quality by a simplified measure called ease of use, our measure of KM system quality captures multiple dimensions of the quality of a KM system. Knowledge workers may find value in using knowledge if the system quality is adequate and the KM system reduces the extra effort required to find or contribute, hence the belief that system quality leads to a high level of KM use and user satisfaction. Systems characterized by their ease of use are those that are clear and understandable, and which require little mental effort to use. Higher system quality has been found to be a significant determinant of user satisfaction in IS literature (Wixom & Todd, 2005). Iivari (2005) has found that a positive relationship exists between system quality and use. Since a KMS is also a type of information system, it is reasonable to expect that higher levels of system quality will enable knowledge workers to accomplish their tasks more quickly, thereby increasing users' overall satisfaction. KMSs that are easier to use will thus involve lower thresholds of use, resulting in increased use.

On the other hands, previous research has established that information quality is positively related to use. In the context of KM success, knowledge quality can be substituted for information quality, as it involves the type of content contained with the system. Knowledge quality is defined as the degree to which the knowledge contained in a KMS is useful in assisting the user to accomplish tasks. Rai et al. (2002) and Halawi, Mccarthy, and Aronson (2007) found that information (or knowledge) quality is significantly related to use. The relationship between knowledge quality and KM use is thus expected to be positive, reflecting the increased benefits that are perceived to be derived from using a system that contains high-quality knowledge. Higher-quality knowledge better fulfills users' information needs, thereby increasing use. In other words, if the quality of knowledge content is high, then a knowledge worker

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is more likely to perceive that KM initiatives contribute to enhanced job performance, hence the belief that knowledge quality leads to a high level of KM use and user satisfaction.

There is little existing literature that examines the relationship between service quality and use at the individual level. Many KM projects are specially aimed at developing a knowledge-intensive culture by encouraging behavior such as knowledge sharing (Davenport, Thomas, & Cantrell, 2002). Gold et al. (2001) noted that the most significant hurdle to effective KM is organizational culture. This means that KM success requires complete solutions that go beyond providing users with an IT-based KM system (Kulkarni et al., 2006–2007). A suitable organizational climate, which manifests itself in the behavior of the workers in a firm, must be established in order to facilitate KM use among members. Knowledge workers' behaviors that are relevant to KM activities may be influenced by the environments of their firms, and thus the influences of setting are expected to strongly determine KM use in KM settings, including those with regard to knowledge accumulation, knowledge sharing, knowledge utilization, knowledge internalization, and knowledge creation.

Additionally, in line with the KM success model, we propose that a combination of system quality, knowledge quality, and service quality determines the level of KM use and overall user satisfaction. Based on the literature review and theoretical analysis, this paper intends to validate the following empirical hypotheses:

H1. System quality is positively associated with KM use.

H2. Knowledge quality is positively associated with KM use.

H3. Service quality is positively associated with KM use.

H4. System quality is positively associated with user satisfaction.

H5. Knowledge quality is positively associated with user satisfaction.

H6. Service quality is positively associated with user satisfaction.

(2) KM use and user satisfaction

KM is a social process, whereby the key point is on encouraging the use of knowledge within organizations (Tzortzaki & Mihiotis, 2014). Relevant literature has found that use is one of the most frequently assessed categories in measuring IS success (Straub & Limayem, 1995). As Seddon (1997) has indicated, use is a good proxy for IS success when it is not mandatory. In comparison with the J&O KM Success Model, which combines use and user satisfaction, we think use is an appropriate measure of success and a key variable in understanding KM success. Therefore, the individual dimension of use has been emphasized in this study to reflect the nature, extent, and appropriateness of use in knowledge management. In our model, KM use is applied as an overall measure of KM-relevant activities, and is not tied to a single system. Although research examining the relationship between use and user satisfaction is scarce, a few studies have examined the reverse relationship, that is, the relationship between user satisfaction and use. Such as Rai et al. (2002) found that there was strong support for the positive relationship between user satisfaction and system use. Additional research is required to evaluate this relationship. In the KM context, Halawi et al. (2007) identified a significant relationship between intention to use and user satisfaction. Chiu, Chiu, and Chang (2007) found a significant relationship between use and user satisfaction in an e-learning context. In a study on medical information systems in which use was mandatory, Iivari (2005) found that use, measured by the amount of daily use and frequency of use, was significantly related to user satisfaction. Given this, and based on the D&M model, we argue that a relationship between use and user satisfaction is entirely possible in the KM context. If a user finds it easy to implement KM-related activities, he or she is more likely to get the correct knowledge for a task through KM, leading to higher user satisfaction. As such, we propose the following hypothesis:

H7. KM use is positively associated with user satisfaction.

(3) KM use dimensions and the benefit dimension

Nowadays, knowledge is widely recognized as the most crucial competitive factor that can substantially support and foster an enterprise's adaptation, survival and outstanding performance (Bohn, 1994; Boisot, 1998; O'Dell & Grayson, 1998; Palacios and Garrigos, 2006). Organizations have long acknowledged that KM is an important tool for gaining competitive advantages and improving performance (Denning, 2006; Griffith, Malhotra, & Neal, 2003). KM is considered to facilitate the achievement of higher performance and efficient responses to customers' needs and requirements (Feng, Sun, & Zhang, 2010). Some observations show a positive relationship between KM and organizational performance (Andreeva & Kianto, 2012; Edler, 2003; Edvardsson, 2006, 2009; Kluge, Stein, & Licht, 2001; KPMG Consulting, 2000; Lim & Ahmed, 2000). Such as Tzortzaki and Mihiotis (2014) suggested that by managing knowledge, organizations can first and most importantly enhance their profitability. Moreover, they can improve on efficiency, which has a positive impact on their market position as they operate more intelligently on the market. Guimaraes and Igbaria (1997) reported a positive effect of system usage and user satisfaction on the impact of end-user jobs for client/server systems success. Igbaria and Tan (1997) found that user satisfaction and system usage are important factors affecting individual impact. The study of Torkzadeh and Doll (1999) indicated that user satisfaction has significant correlation with the four dimensions of impact scale: task productivity, task innovation, customer satisfaction, and management control. On the other hands, Omerzel and Antoncic (2008) pointed out that effective KM improves the organization's capability to survive, grow and maintain competitive advantage.

Different stakeholders might have different opinions regarding what constitutes a benefit (Seddon, Staples, Patnayakuni, & Bowtell, 1999). Edvardsson and Durst (2013) found that SMEs can benefit from KM activities. Our model evaluates success as an improvement in net benefit, based on the use and impact of KM. Since the focus of this study is on the measurement of KM success from the perspective of knowledge workers, net benefit in this study refers to knowledge workers' perceived net benefit evaluation of relevant KM activities. Many organizations are spending a great deal of resources in launching KM to support their knowledge work and cultivate learning behavior within organization. If knowledge workers perceive KM as having potential value in terms of increasing work effectiveness, decision-making quality or fostering creativity and innovativeness, it will reinforce the success of a KM effort. Furthermore, in accordance with the D&M model, this study proposes that the two dimensions of KM use and user satisfaction both lead to greater net benefit. Therefore, the extent to which KM use is deemed essential for a knowledge worker's job performance may reflect its KM quality. If so, a knowledge worker will participate in KM activities to enhance his or her job performance. This suggests adding a causal path from KM use to work performance. Based on this, we have formulated the following hypotheses:

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H8. KM use is positively associated with net benefit.

H9. User satisfaction is positively associated with net benefit.

3.3. Targets for questionnaire survey

A survey-based approach is appropriate for this investigation because our goal is to test the theoretical model, which is developed based on insights in earlier software development research (Pinsonneault & Kraemer, 1993). Furthermore, knowledge now plays and will continue an important role in the future in determining a firm's capability to innovate and hence, its long-run effectiveness and survival. A growing percentage of the total workforce is composed of knowledge workers. Thus, this study performed an in-depth analysis of the influence of KM implementation on the task performance of knowledge workers for various Taiwanese industries. A field where research on KM is still fragmented and quite limited, we focus our study in the context of SMEs using convenience sampling technique.

For this study, we aimed to collect data from 323 managers and practitioners working in production, marketing, sales, finance and administration departments, employed in 21 SMEs. Respondents are from various industry sectors but are categorized under three main areas including high-tech, manufacturing, and knowledge services industry such as software development, innovation, and cultural. And they already used various forms of KMSs, and who had implemented KM-relevant activities. The survey was conducted from July 2010 to October 2010. Of the 323 participants solicited, 46 respondents in the sample did not participate in or complete the study, yielding a response rate of 85.8%.

3.4. Measures of KM/KMS success model

(1) Measures of three quality dimensions

All the constructs and measures in this study were based on existing instruments and KM/KMS literature. The items in the questionnaire that was employed were measured using a seven-point Likert scale, ranging from (1) strongly disagree to (7) strongly agree.

3.4.1. System quality

System quality is defined by how well a KMS performs the functions of knowledge creation, storage/retrieval, transfer, and application. System quality includes sub-dimensions such as ease of search, ease of navigation, response speed, and ease of communication with other users (Wixom & Todd, 2005). It represents the quality of the information system processing involved, which includes software and data components, and is a measure of the extent to which the system is technically sound. In the J&O model, system quality jointly covers the aspects of a KMS that are found to be most critical, based on empirical observation, in understanding what system quality is in KM settings. The dimensions of system quality indicate the capability of an organization to develop, operate, and maintain a KMS. This construct captures ideas about the networks, databases, and other hardware involved in a KMS, as well as the experience and expertise behind the KMS initiative and the usage competence of typical KMS users.

3.4.2. Knowledge quality

Knowledge quality refers to the quality of the outputs that a KMS produces, whether in the form of reports or online screens. Knowledge quality typically includes sub-dimensions such as knowledge accuracy, completeness, timeliness, and relevance (Wixom & Todd, 2005). It is determined by whether the right knowledge, with sufficient contextual information, is captured and made available to the right users at the right time. In the J&O model, knowledge quality involves richness and linkages. Richness means that a sufficient amount of knowledge is available to make the knowledge useful. Linkages are the knowledge and topic maps or listings of expertise available to an organization.

3.4.3. Service quality

According to the J&O model, service quality involves those aspects of a KMS that ensure it adequately supports users in using the KMS effectively. This dimension comprises two sub-dimensions. The first sub-dimension, encourage, has to do with the allocation of adequate resources, encouragement and direction, and control. The second sub-dimension, resource service quality, involves support from the organization, with regard to how to use the KMS in general, how to capture knowledge as part of work, and how to use the KMS in business processes.

(2) Measures of two use dimensions

3.4.4. KM use

To measure KM use, we have applied the knowledge circulation process of Lee, Lee, and Kang (2005), including knowledge accumulation, knowledge sharing, knowledge utilization, knowledge internalization, and knowledge creation, in order to understand the conditions of use for knowledge management. The dimension of use refers to the degree to which a knowledge worker believes he or she has incorporated procedures for the capture and use of knowledge of various types of decision-making activities and in the utilization of the outputs of the system.

3.4.5. User satisfaction

The user satisfaction dimension is a construct that measures users' satisfaction with KM. User satisfaction is based on subjective evaluations of various outcomes of the knowledge management systems existing within an organization.

(3) Measures of the benefit dimension

3.4.6. Net benefit

The benefit dimension involves the overall benefits of KM, which means that KM success is essentially defined as improved performance. An individual's use of KM influences his or her performance in the workplace. The benefit dimension construct combines impacts on both user change and performance, and recognizes that the use of KM may increase the effectiveness of knowledge workers. KM gives users a better understanding of decision-making contexts, improves their decision-making, alters their activities, and changes their perceptions of importance.

4. Data analysis and results

4.1. Data collection

The questionnaire was distributed and collected from the practitioners/managers of businesses that are categorized as SMEs based in Taiwan to test our research model. Table 2 lists the demographic information collected from respondents with regard to gender, age, educational level, work position, industry type, and total number of employees at their companies.

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Table 2
Demographic characteristics of the sample.

Variables	Categories	Frequency	Percent
Gender	Male	137	49.5%
	Female	140	50.5%
Age	<30	77	27.8%
	30–50	180	65.0%
	>50	20	7.2%
Education	High school	71	25.6%
	Junior college	69	24.9%
	University	108	39.0%
	Master	25	9.0%
	Ph. D.	4	1.5%
Positions	Management staff	96	34.7%
	Non-management staff	181	65.3%
Industry types	Traditional manufacturing	116	41.9%
	Service	34	12.3%
	Cultural and educational industry	34	12.3%
	Transport industry	5	1.8%
	Wholesale and retail	3	1.1%
	IT services/software industry	23	8.3%
	Finance and insurance	32	11.6%
	Communications electronics	4	1.4%
	Hospital	6	2.2%
	Tourism and catering industry	5	1.8%
	Nonprofit groups	15	5.4%
# of Employee	1–50	98	35.4%
	51–100	16	5.8%
	101–500	86	31.0%
	501–1000	43	15.5%
	>1000	34	12.3%

4.2. Data analysis

In the study, we adopt partial least square (PLS) method to analyze the data. PLS is a structural equation modeling technique which uses a component-based approach to evaluate the relationship within, and variance explained by a structural equation model. The PLS technique is increasingly being used in IS research because it requires minimal sample size and places negligible demands on residual distributions (Chin, 1998). Benaroch, Lichtenstein, and Robinson (2006) pointed out that PLS has the ability to handle relatively small sample sizes, making it appropriate for our data set. Besides, it is suitable for our study because it can give more accurate estimates of mediating effect by accounting for the measurement error that attenuates the estimated relationships and improves the validation of theories (Henseler & Fassott, 2010). Also, PLS works better when the objective is 'prediction', the model is relatively complex, and the phenomenon under study is new or changing (Chin & Newsted, 1999). Overall, it ensures robust solutions in estimating complex relationships among variables (Chin, 2010).

In accordance with Anderson and Gerbing (1988), the data analysis process of SEM was divided into two steps: (1) measurement model analysis, which involved following the initial analysis with a confirmatory factor analysis (CFA) to measure the reliability and validity of the latent variables, and (2) structural model analysis, in which hypotheses were tested by examining path coefficients and their significance.

(1) Measurement model analysis

We pre-tested our survey questionnaires by asking professionals handling management information systems to assess their logical consistency, ease of understanding, sequencing of items, contextual relevance, and suggestions on item contents and instrument structure. Our study was found to have both face and content validity.

According to Anderson and Gerbing (1988), the measurement model provides a confirmatory assessment of reliability, convergent validity, and discriminant validity. Cronbach's alpha, individual item reliability, and composite reliability (CR) tests were performed in order to verify reliability. First, each construct in this study was measured in terms of each factor, according to Cronbach's alpha values. As shown in Table 3, all the Cronbach's alpha values range from 0.91 (for the US) to 0.95 (for SQ, KQ, KU). According to Nunnally (1978), the lowest limit for Cronbach's alpha values should be 0.7. The Cronbach's alpha value of each construct was above 0.7, which indicated high internal consistency. In addition, individual item reliability was assessed by examining the factor loadings of the measures with their respective constructs. The reliabilities of individual items are considered adequate when loadings exceed 0.5 (Rivard & Huff, 1988). The results of our factor loading analysis showed that four items, KU 1, 2, 20, and 21, had values of less than 0.5 and thus these items were eliminated from further analysis. Finally, we assessed reliability by examining composite reliability (CR), and found that our CR was over 0.7, indicating that the scales involved were of satisfactory reliability (Chin, 1998; Fornell & Larcker, 1981). We thus found that the reliability of our scales was acceptable.

Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. In this study, we assessed convergent validity by examining average variance extracted (AVE). As seen in Table 3, the AVE for all constructs was above 0.5, which indicates that the scales had good convergent validity (Fornell & Larcker, 1981).

To assess discriminant validity, we evaluated the measures when the square root of each factor's AVE was larger than its correlation with other factors (Chin, 1998). Table 4 provides the results of the analysis and the discriminate validity assessed by using the correlation of latent variables, wherein the square roots of the average variances were calculated for each of the constructs along the diagonal. We found that all square roots of AVE were larger than their corresponding coefficients of correlation with other factors. Overall, our analyses demonstrated that the study scales possessed convergent and discriminant validity.

(2) Structural model analysis

In this study, a PLS structural model analysis using Smart PLS was conducted for each hypothesis path coefficient and the percentage of the variance explained (R^2) values. Path coefficients represent the strength of the relationships between dependent and independent variables. R^2 was used as an indicator of the overall predictive strength of the model. The greater an R^2 value, the better a model's predictive quality (Fornell & Bookstein, 1982; Wixom & Watson, 2001). The results for H1 through H9 were determined by using PLS, as presented in Fig. 2. As can be seen, the positive correlations between the constructs suggest that there were grounds for expecting their significant effects on each other. First, we tested the relationship between quality construct and KU. H1 tested the relationship between SQ and KU. A strong positive relationship was observed ($\beta = 0.31$, $p < .001$). H3 tested the relationship between KQ and KU, and a positive and significant relationship was found ($\beta = 0.17$, $p < .05$). SEQ was found to have a positive effect on KU, thereby supporting H5 ($\beta = 0.18$, $p < .05$).

In order to illustrate the influences of quality on user satisfaction, we examined the relationship between SQ, KQ, SEQ, and US. H2 showed a positive relationship between SQ and US ($\beta = 0.01$, $p < .05$). With regard to H4, the link between KQ and US was found to be significant ($\beta = 0.37$, $p < .001$). For H6, the relationship of SEQ and US were tested, and strong positive relationships were observed ($\beta = 0.41$, $p < .001$). The results are expressed in the same

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Table 3
Summary of reliability and validity for measures.

Construct	Measure item	Factor loading	AVE	CR	Cronbach's α
System quality (SQ)	sq1. Your KS allows you to do both information and people searches.	0.71	0.67	0.96	0.95
	sq2. Whenever you search the KS knowledge base and/or yellow pages, the retrieved knowledge is always what you need.	0.81			
	sq3. Whenever you search the KS knowledge base and/or yellow pages, the returned linkage always directs you to the right person.	0.84			
	sq4. Whenever you search the KS knowledge base and/or yellow pages, the retrieved results normally display quickly.	0.87			
	sq5. Your KS search function is easy to use.	0.80			
	sq6. Your KS is not subject to frequent problems and crashes.	0.77			
	sq7. Your KS allows you to find most of the organizational information/knowledge online.	0.79			
	sq8. Whenever you search the KS, you don't need to try different ways to locate the needed information.	0.85			
	sq9. Whenever you search the KS, you don't need to try different ways to locate the right person.	0.86			
	sq10. Whenever you search the KS, you don't need to access more than one system to locate the needed information.	0.86			
	sq11. Whenever you search the KS, you don't need to access more than one system to locate the right person.	0.83			
Knowledge quality (KQ)	kq1. Your KS provides information/knowledge that is exactly what you need.	0.78	0.62	0.96	0.95
	kq2. Your KS provides information/knowledge that uses recognized vocabulary rather than highly specialized terminology.	0.80			
	kq3. Your KS provides information/knowledge that is adequate for you to complete tasks.	0.83			
	kq4. Your KS provides contextual information/knowledge so that you can truly understand what is being accessed.	0.81			
	kq5. Your KS provides contextual information/knowledge so that you can easily apply it to your work	0.80			
	kq6. Your KS provides up-to-date information/knowledge.	0.80			
	kq7. The knowledge portal of your KS links you to a complete collection of documents and data.	0.80			
	kq8. The yellow pages of your KS guides you to connect to the people with the know-how for which you are seeking.	0.85			
	kq9. Your organization keeps updating its knowledge portal so that you have access to current documents and data.	0.80			
	kq10. Your organization keeps updating its yellow pages so that you can locate newly hired or acquired expertise without a problem.	0.79			
	kq11. The knowledge management system enables me to control the settings of knowledge documents.	0.77			
	kq12. The knowledge management system enables me to control the presentation of knowledge documents.	0.79			
	kq13. The knowledge management system enables me to define my favorite knowledge.	0.70			
	kq14. The knowledge management system can record my retrieval and reading history.	0.68			
Service quality (SEQ)	seq1. Whenever you have difficulties with your KS, there is a specific person (or group) exist to help you.	0.79			
	seq2. You have sufficient time to engage in dialogue online with your coworkers about important problems and solutions.	0.85	0.71	0.94	0.92
	seq3. You are encouraged to engage in online exploration and experimentation by your peers.	0.89			
	seq4. You are encouraged to engage in online exploration and experimentation by your supervisor	0.85			
	seq5. Your organization actively endorses knowledge sharing.	0.84			
	seq6. Your organization encourages online discussion of new ideas and working methods.	0.83			
KM use (KU)	ku3. I fully understand the core knowledge necessary for my tasks.	0.67	0.51	0.95	0.95
	ku4. We refer to corporate database before processing tasks.	0.72			
	ku5. We extensively search through customer and task-related databases to obtain knowledge necessary for the tasks.	0.68			
	ku6. We try to store expertise on new tasks design and development.	0.71			
	ku7. We try to store legal guidelines and policies related to tasks.	0.76			
	ku8. We are able to systematically administer knowledge necessary for the tasks and store it for further usage.	0.70			
	ku9. We document such knowledge needed for the tasks.	0.74			
	ku10. We summarize education results and store them.	0.75			
	ku11. We share information and knowledge necessary for the tasks.	0.75			
	ku12. We improve task efficiency by sharing information and knowledge.	0.77			
	ku13. We promote sharing of information and knowledge with other teams.	0.77			
	ku14. We developed information systems, like intranet and electronic bulletin boards, to share information and knowledge.	0.70			
	ku15. EDI is extensively used to facilitate processing tasks.	0.66			
	ka16. Work flow diagrams are required and used in performing tasks.	0.72			
	ku17. There exists a culture encouraging knowledge sharing.	0.73			
	ka18. There exist incentive and benefit policies for new idea suggestions in utilizing existing knowledge.	0.68			
	ku19. There are research and educational programs.	0.70			
	ku22. I can use the Internet to obtain knowledge for the tasks.	0.64			
	ku23. I can refer to best practices and apply them to my tasks.	0.68			
User satisfaction (US)	us1. As a whole, I am satisfied with the knowledge management system.	0.96	0.91	0.95	0.91
	us2. As a whole, the knowledge management system is successful.	0.95			

(*continued on next page*)

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Table 3 (*continued*)

Construct	Measure item	Factor loading	AVE	CR	Cronbach's α
Net benefit (NB)	nb1. Your KMS helps you to detect work-related problems.	0.82	0.69	0.95	0.94
	nb2. Your KMS enlightens you to new ways of thinking.	0.84			
	nb3. Your KMS changes the way you do things in a way beneficial to the organization's overall interest.	0.87			
	nb4. Your KMS improves the decisions you make.	0.84			
	nb5. Your KMS helps you to make fewer mistakes.	0.82			
	nb6. Your KMS allows better experience transfer and knowledge reuse.	0.85			
	nb7. Your KMS reduces duplicate work.	0.76			
	nb8. Your KMS allows you faster cycle time to problem resolution.	0.85			

Table 4
Correlations among study variables.

Construct		KU	NB	KQ	SEQ	US	SQ
1	KM use (KU)	0.71					
2	Net benefit (NB)	0.68	0.83				
3	Knowledge quality (KQ)	0.53	0.55	0.79			
4	Service quality (SEQ)	0.52	0.46	0.73	0.84		
5	User satisfaction (US)	0.50	0.51	0.72	0.73	0.95	
6	System quality (SQ)	0.56	0.54	0.74	0.70	0.61	0.82

Note. Square root of AVE is on the diagonal.

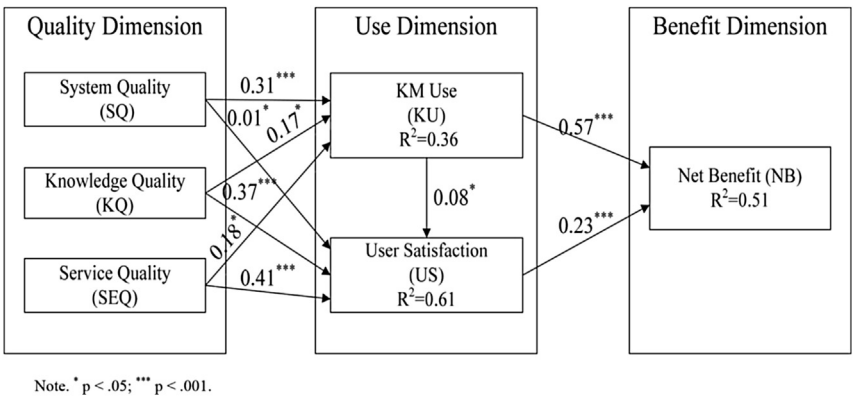

Fig. 2. Hypothesis testing results of PLS analysis.

manner as explained by Wang et al. (2007) and Wixom and Todd (2005).

A strong positive relationship was also found between KU and US, thereby supporting H7 ($\beta = 0.08$, $p < .05$). Approximately 36% of the variance in KU and more than 61% of the variance in US was explained by SQ, KQ, and SEQ. These results were entirely consistent with those of previous studies (DeLone & McLean, 2003; Doll & Torkzadeh, 1988; Kulkarni et al., 2006–2007; Rai et al., 2002; Seddon, 1997; Wu & Wang, 2006). Finally, in determining the benefit dimension, we noted that IB was affected by KU ($\beta = 0.57$, $p < .001$), as well as by US ($\beta = 0.23$, $p < .001$), which supported H8 and H9. In addition, 51% of the variance in IB was explained by KU and US.

As can be seen from Table 5, overall, our hypothesized research model was supported. The total effects (considering both direct and indirect effects) on net benefit are 0.18 for system quality, 0.19 for knowledge quality, 0.20 for service quality, 0.59 for KM use, and 0.23 for user satisfaction. Especially, KM use was found to have the strongest direct and total effect on net benefit, indicating the importance of the use of KM in increasing net benefit. This means that the implement of KM activities that are more relevant by knowledge workers enables them to obtain greater benefits. In addition, Table 5 shows that the total effect of system quality on KM use and of service quality on user satisfaction and net benefit, are greater than others. Furthermore, based on Fig. 2, a total of 51% variance of net benefit is explained by system quality, knowledge quality, service quality, KM use, and user satisfaction together; 61% of the variance of user satisfaction is explained by system quality, knowledge quality, service quality, and KM use; 36% of the variance of KM use is explained by system quality, knowledge quality, and service quality.

5. Conclusion

5.1. Discussion

KM has received particular attention over the past two decades, as it offers a means for organizations to gain competitive

Table 5
The direct, indirect, and total effect of dominants on net benefit.

	Direct effect			Indirect effect			Total effect		
	KU	US	NB	KU	US	NB	KU	US	NB
SQ	0.31	0.01			0.02	0.18	0.31	0.03	0.18
KQ	0.17	0.37			0.01	0.19	0.17	0.38	0.19
SEQ	0.18	0.41			0.01	0.20	0.18	0.41	0.20
KU		0.08	0.57			0.02		0.08	0.59
US			0.23						0.23

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advantages. It is true that in many SMEs there is an absence of systematic KM, this does not imply that KM is less important than for large companies; indeed, it can be argued that this is a distinctive factor for SMEs' survival (Durst & Edvardsson, 2012). An important implication is that managers should create an environment to support KM relevant activities. Prior research has indicated that the measurement of KM effectiveness or success is crucial to understanding how KM should be built and implemented. This study presents and validates a model of KM success from a knowledge-based perspective, based on the J&O KM success model, which captures the multidimensional and interdependent nature of KM success. Through theoretical discussions and literature review, a questionnaire survey and statistical analysis on SMEs in Taiwan, the results indicate that a correlation exists between KM quality, KM use and KM successful implementation. Overall, the results of empirical investigation are positive and supportive were consistent with most prior IS research. That is, the better the KM qualities of system, knowledge, and services, the more KM use and user satisfaction will be, which can lead to better net benefit. The results were consistent with previous IS success model research (DeLone & McLean, 2004; Molla & Licker, 2001; Rai et al., 2002; Seddon, 1997; Seddon & Kiew, 1996).

Among them, system quality is the most significant determinant of KM use than others. As suggested by Markus (2001), knowledge use may depend on how remote and dissimilar knowledge users are from knowledge generators. Users from different functional areas or with differences in terms of breadth and depth of knowledge may face difficulty in defining search terms (when using a KMS). Users who do not know the right jargon, terminology, questions to ask, or symptoms to report will drown in unnecessary or unhelpful knowledge. It is therefore important to develop and provide users a system with a feature-rich interface that will retrieve and present different types of knowledge in an efficient manner. Alternatively, the system may put them in touch with experts who can provide the needed knowledge and help them interpret and apply the available knowledge (Kulkarni et al., 2006–2007). In addition, compared with system quality and knowledge quality, service quality has a greater influence on user satisfaction. Users may start to consider KM to be a part of their working life. Thus, system operation is no longer an important issue. Its effect may be important during the initial implementation but subsides over time.

With regard to the implementation of KM, measuring multiple KM success variables continues to be important. This model provides a rich profile of the dynamics surrounding quality measures, KM use, satisfaction evaluation, and net benefit. Our research also confirms that KM use, user satisfaction and net benefit are complementary yet distinct constructs, and that KM use is mediated through user satisfaction in its influence on the net benefit of KM. To develop KM successfully, it is essential to ensure KM access at the workplace, provide the relevant knowledge for users, and maintain service levels, all of which are helpful in increasing KM use and the perception of user satisfaction, which, in turn, are helpful in increasing the net benefit of KM.

The primary contribution of this research is in furthering our understanding of how to assess and promote KM success in SMEs context. It makes several contributions to this area. First, our results are validated within a Taiwan context, whereas most previous studies have been based on other countries' companies. We use a comprehensive instrument to measure an individual impact construct, considering both change variables and performance variables, which is an approach that has been lacking in most existing studies on KM success models. Second, the study examines the direct and indirect linkages among quality dimensions, use dimensions, and benefit dimensions, which, to the best of our knowledge, has not been previously explored in the KM context. Our results provide evidence of the direct and indirect effects of quality on individual impact, and indicate that of all the constructs, KM use has the greatest effect on individual impact. Third, in contrast to previous research on KM success models, we used a multifaceted instrument for KM use that included knowledge accumulation, knowledge sharing, knowledge utilization, knowledge internalization, and knowledge creation. Thus, our measurement instrument for KM use is more comprehensive than those used in most previous studies as it includes constructs knowledge circulation process. We also used more comprehensive instruments for system quality (eleven items), knowledge quality (fourteen items), and service quality (six items) compared to previous studies on knowledge workers.

5.2. Theoretical implications

To date, the implementation of KM in SMEs has not been systematically investigated. Existing studies have explored KM activities and strategies from large companies' perspectives and have not considered the needs of smaller businesses. This paper is aimed to bridge this gap. Such as Durst and Edvardsson (2012) stressed, the adoption of KMS is generally considered to impact on firm performance, but we lack empirical evidence supporting this idea on SMEs' performance. Burgess, Sellitto, and Karanasios (2009) pointed out that there is a need to further develop a proper understanding of KM in SMEs context as they are different from large organizations. However, factors influencing the success of KM have seldom been empirically examined in prior research and whether traditional IS success models can be extended to investigating KM success has not been examined thus far in Taiwanese settings. Until now, the D&M IS Success Model is a generally accepted model for assessing success of an IS. This research was conducted in response to a call for studies on the continuous challenges and tests involved in applying IS success models in different contexts. Based on the D&M and J&O models, we proposed and validated a comprehensive, multidimensional model of KM success, which considers six success measures: system quality, knowledge quality, service quality, KM use, user satisfaction, and net benefit. The model presented in this paper is a viable approach to assessing KM success and meets the spirit and intent of DeLone and McLean (1992, 2002).

5.3. Managerial implications

Intense competition, fickle consumers, shorter product life cycles, and globalization are some of the driving forces that have led to the increased inspection of the usage, application, and leveraging of knowledge in organizations (Anantatmula & Kanungo, 2006). The study concentrated on KM quality and use that practitioners considers important when implementing KM in SMEs. The KM success model has three basic dimensions as antecedents to KM success: system quality, which deals with the technical infrastructure; knowledge quality, which deals with KM strategy for identifying critical knowledge and how that knowledge is stored; and service quality, which deals with management support and allocation of resources. These dimensions deal with ensuring that the KM implementation meets the needs of the users and the organization. Furthermore, the model could provide some guidelines at placing the CSFs into a theoretical framework that explained how they led to KM success. Probably, this is the first study to present an integrative viewpoint for implementing KM successfully in SMEs. It is hoped that this research finding can serve as a reference for SMEs in the implementation of KM and provide a great help in enhancing management performance.

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In the era of knowledge economy, organizations are increasingly tend to management knowledge. Research in the area of Taiwanese SMEs practices has an added significance because of the increased importance of Asia. For suitable implementing and more enjoying the benefits of KM, a model for measuring success of KM is essential. Taken together, the results of this study are important to KM practitioners: (1) provide a basic for SMEs valuation; (2) stimulate management to focus on what is important; (3) justify investments in KM activities; and (4) build and implement efficient KM initiatives and systems. Given the prevalence of SMEs on the one hand and their resource limitations on the other, there is a strong need on this topic to provide actual proof of the implementation of KM activities which would help SME owners to make better decisions regarding resource allocation.

5.4. Limitations and directions for future research

The validity of the KM success model cannot truly be established on the basis of a single study, and so caution should be exercised in generalizing our findings. Certain limitations must be considered while utilizing the results of this study. The most important limitation in this research was sample. The sample in this study comprised an instrument which was self-administered. Secondly, the empirical results are derived from a sample of Taiwanese SMEs and hence the findings might be country-specific. Further, the data for this study are based the respondents' perceptions, which may vary widely across industries, ownership and function and work experience of respondents within the SMEs. Future research can select SMEs from other countries to examine and enlarge the generalization of the findings. On the other hand, applying the KM success model in different stages could provide a more comprehensive picture that would increase our understanding of KM development. In addition, it should also be considered that many important exogenous variables might influence KM success. This study provides a foundation for further research that could contribute to the existing knowledge in this area. Additional research is required to explore the applicability of the success model in more diverse settings.

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