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Determinants of firms' knowledge management system implementation: An empirical study

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ABSTRACT

As knowledge becomes an increasingly valuable and important organizational asset, many firms anticipate that implementing the knowledge management systems (KMS) will effectively support and enhance organizational knowledge management activities. Even some firms regard KMS as an emerging and powerful source of competitive advantages.

However, the implementation of KMS differs from that of traditional enterprise information systems. The implementation of KMS is difficult and risky since these systems are unstructured and so technologically innovative. Thus, effort is required to identify determinants affecting KMS implementation in businesses.

Based on innovation diffusion theory and technology-organization-environment framework, this study develops and tests an integrated model of knowledge management systems implementation for businesses. Survey data were collected from 291 businesses in Taiwan. Confirmatory factor analysis and logistic regression technique were used test the hypothesized relationships. The results show that technological innovation factors (perceived benefits, complexity, and compatibility), organizational factors (top management support, organizational culture), and environmental factors (competitive pressure) are significant influences on KMS implementation in firms. Finally, the implications and future research on KMS implementation are discussed.

1. Introduction

Nowadays, the importance of knowledge is outstripping traditional resources such as labor, land, and financial capital. The possession of unique knowledge and effective knowledge leverage will lead to competitive advantages for businesses (Nonaka, Toyama, & Nagata, 2000; Quast, 2012; Wu & Wang, 2006). Knowledge has become a key strategic resource for all types of businesses, from multi-nationalized to small or medium-sized enterprises (Holsapple & Joshi, 2000). Knowledge is, however, intangible, boundaryless, context-specific, relational, dynamic and humanistic. In organizations it is frequently embedded within organizational processes and routines. Furthermore, knowledge is difficult to grasp, transfer, imitate, and transact (Nonaka et al., 2000). Therefore, effective knowledge management is critical and central to organizations' success (Chen, Huang, & Cheng, 2009).

To enhance the effectiveness and efficiency of knowledge management, many organizations utilize information and communication technologies to implement knowledge management systems (KMS). Such systems are designed specifically to facilitate and support the organizational processes of knowledge creation, storage, retrieval, transfer, and application (Alavi & Leidner, 2001). However, the implementation of KMS differs from the implementation of traditional enterprise information systems. Compared with traditional enterprise information systems, there are no exact requirement specifications about KMS inputs, processes, and outputs (Lin, 2013). Implementing KMS is not just a technological issue; rather it concerns organizational culture, structure, process, and human factors (Bertoni, Johansson, Larsson, & Isaksson, 2008; Quaddus & Xu, 2005). As a result, the implementation of KMS is comparatively more difficult, risky, and technologically innovative (Eisenhauer, 2015; Mankin, 2015; Soualhia, Maazoun, & Affes, 2014). Businesses usually invest significant time and resources to implement KM system project (Azhdari, MousaviMadani, & ZareBahramabadi, 2012).

The unique characteristics of KMS motivate a need to

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understand and identify factors that affect firms' implementation of KMS (Alavi & Leidner, 2001; Chua, 2004; Kuo & Lee, 2011; Leech & Sutton, 2002; Lin, 2013; Mankin, 2015). We draw on innovation diffusion theory (IDT) (Rogers, 1983) and the technology-organization-environment (TOE) framework (Tornatzky & Fleischer, 1990) to model factors that facilitate and inhibit the implementation of KMS. The results of this study will provide empirical evidences to obtain a comprehensive explanation and understanding for the firms' decision whether to implement KMS. The study will provide insightful implications to the researchers and practitioners for assessing and implementing KMS.

The rest of this paper is organized as follows. In the next section, the background literature pertaining to KMS, IDT, and the TOE framework are reviewed. The research model and hypotheses are then presented. Then, the research method and sample characteristics are explained followed by the data analysis results. Finally, the last two sections offer a discussion and conclusions.

2. Background

2.1. Knowledge management system

KMS is an information system that is specifically developed to facilitate the processes of creating, storing, retrieving, transferring, and applying organizational knowledge (Alavi & Leidner, 2001). That is, the main purpose of KMS is to leverage organizational knowledge management behaviors. Although KMS have diverse forms, there are three salient features of KMS: *knowledge repositories*, *knowledge maps*, and *collaborative tools* (Alavi & Leidner, 1999; Bernard, 2006).

Knowledge repositories are the most common type of KMS (Davenport & Völpel, 2001) and emphasize the codification and storage of knowledge to facilitate knowledge reuse (Kankanhalli, Tan, & Wei, 2005; Lin & Huang, 2008). Knowledge repositories preserve organizational memory and provide functions for capturing, generating, organizing, searching, retrieving and using knowledge and information (Holsapple, 2003; Wasko, 1999). They comprise databases that document best practices, experiences and other codified knowledge of experts. By using knowledge repositories employees can be more effective and efficient at work. Fig. 1 shows Housel and Bell's (2001) context model for knowledge repositories. The knowledge repositories can preserve organizational memory and provide functions for capturing, generating, organizing, searching, retrieving and using knowledge and information (Holsapple, 2003; Wasko, 1999). The employees make use of knowledge repositories to be more effective and productive in their works.

Knowledge maps are the second feature of KMS. Knowledge maps, also referred to as expert directories, are searchable indexes or catalogues of expertise held by individual employees (Gray, 2000). They provide a means of finding and contacting individuals who hold specialized knowledge and experiences (Alavi & Leidner, 1999). As tacit knowledge is, by definition, hard to capture and store, much knowledge in an organization remains uncodified. Therefore, mapping individuals' expertise is another useful way of organizational knowledge management (Alavi & Leidner, 2001; Malhotra, 2003).

Collaborative tools are the third feature of KMS. These tools, such as groupware, email, chat, electronic forums and conferencing, provide communication and collaboration services (Bernard, 2006; Chua, 2004). The collaborative tools enable knowledge exchange among knowledge seekers and knowledge providers.

Knowledge maps and collaborative tools correspond to the network KM approach (also known as the personalized KM approach) that emphasizes the linkage, interaction, and dialogue among people for the purpose of knowledge exchange (Desouza, 2003). Knowledge maps provide the location of expertise and collaborative tools allow people to interact with each other (Kankanhalli et al., 2005).

2.2. Innovation diffusion theory

The innovation diffusion theory (Rogers, 1983) is widely used for analyzing implementation of IS innovation (Moore & Benbasat, 1991; Wu & Wang, 2005). The theory suggests five key

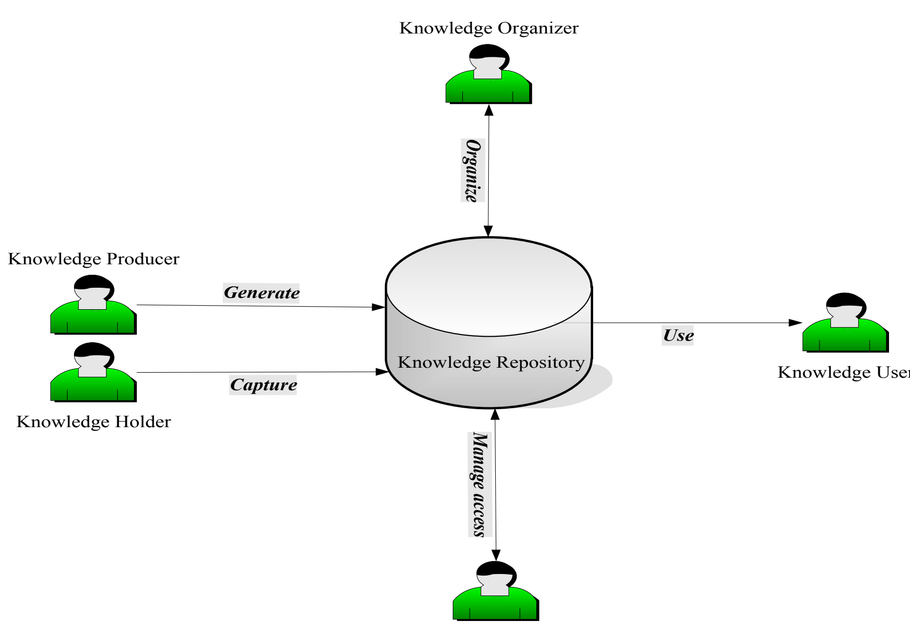

Fig. 1. A context model for knowledge repositories (Housel & Bell, 2001).

innovation characteristics: relative advantage, compatibility, complexity, trialability, and observability. The perceptions of these innovation characteristics influence whether an organization accepts or rejects an innovation. The conceptual definitions of these five characteristics are shown in Table 1.

However, these five innovation characteristics do not always explain effectively the underlying causes of implementing new technological innovations. Tornatzky and Klein's (1982) meta-analysis finds that only three innovation characteristics (i.e., relative advantage, compatibility, and complexity) relate consistently to technology adoption. Significant IDT-based research focuses on these three salient characteristics while excluding trialability and observability (e.g., Grover, 1993; Lee & Kim, 2007; Thong, 1999; Wu & Chiu, 2015; Wu & Wang, 2005).

Although IDT is useful to analyze firm-level innovation implementation, the theory has some weaknesses. One major weakness of IDT is a focus on the technological aspects to the exclusion of organizational and environmental factors (Chweols, Benvasat, & Dexter, 2001; Lee & Cheung, 2004). The fact that IDT does not provide a complete explanation for technology innovation means it is appropriate to search alternatives (Brancheau & Wetherbe, 1990; Hameed, Counsell, & Swift, 2012). By integrating IDT with other innovation theories it is possible to more effectively explain organization-level innovation (Hameed et al., 2012; Mohammad, 2013). The technology-organization-environment (TOE) framework (Tornatzky & Fleischer, 1990) is particularly appropriate to integrate with IDT (Lin & Lin, 2008; Thong, 1999; Yoon & George, 2013; Zhu, Dong et al., 2006).

2.3. The technology-organization-environment framework

The TOE framework (Tornatzky & Fleischer, 1990) is often used to analyze the implementation of technological innovations at the organizational level (Zhu, Dong et al., 2006; Zhu, Kraemer, & Xu, 2006). The framework identifies three contexts that may facilitate or impede the organizational implementation of technological innovations: (1) technological, (2) organizational, and (3) environmental. Technological context refers to the firm's perceptions of existing and emerging characteristics of the innovative technology (Hong & Zhu, 2006). The organizational context relates to descriptive characteristics of the organization, such as size, scope, resources available and organization formalization (Tornatzky & Fleischer, 1990). The environmental context is the arena in which a firm conducts its business. The context includes factors that are external to the organization and are usually beyond management's control (e.g., competitors, competitive intensity, information intensity, market uncertainty and customer-supplier relations) (Teo et al., 1997–8; Tornatzky & Fleischer, 1990).

Table 1
The conceptual definitions of innovation characteristics in IDT.

Innovation characteristics	Definition
Relative advantage	The degree to which an innovation is perceived as being better than the idea it supersedes.
Compatibility	The degree to which an innovation is consistent with the business processes, practices, and value systems.
Complexity	The degree to which an innovation is perceived as relatively difficult to understand and use.
Trialability	The degree to which an innovation may be experimented with on a limited basis.
Observability	The degree to which the results of an innovation are visible to others.

[Data source: (Rogers, 1983; Zhu, Dong, Xu, & Kraemer, 2006)].

Table 2 summarizes the relevant prior studies basing on the TOE framework. Two particular insights can be drawn from this table. First, the TOE framework relates to a variety of information technologies while also possessing explanatory power across a diversity of technological innovations. Second, the specification of variables, within each context, varies according to the type of technology. Although the TOE framework provides a sound starting point for building a research model, researchers need to account for the type of technology when specifying variables to explain the innovation adoption.

2.4. Prior studies related to factors affecting KMS implementation and success

KMS implementation can be deeply analyzed according to the IT innovation adoption processes (Lee, Wang, Lim, & Peng, 2009). The processes can be simplified into two main stages: pre-adoption and post-adoption (Lee & Xia, 2006; Lin, 2013; Saeed & Abdinnour-Helm, 2008). At the pre-adoption stage, companies gather and evaluate information related to KMS and then make a decision about whether or not to adopt/implement KMS. When the companies decide to formally go ahead, KMS development will enter the post-adoption stage. The companies will build up project teams, implement and deploy KMS, assess the KMS success and benefits, and make employees to use KMS as a part of their work processes (Lee et al., 2009; Zhu, Dong et al., 2006).

Ryan & Prybutoka (2001) applied the TOE framework to investigate the *factors affecting the adoption of KM technologies*. The three KM technologies are Intranets, data warehouses, and groupware. This study used the discriminative approach to test the hypothetical relationships based on 220 responses. Three factors in organizational and technological contexts were found to be significantly related to the adoption. These factors are strategic relevance of IT, installed user-centric technologies, and the levels of IT investment. However, the only environmental variable, i.e. industry sector, was found to be insignificantly related the adoption. This study partially supported the TOE framework for analyzing the adoption of KM technologies. This study suggested that other environmental context variables should be investigated whether they may influence KM adoption.

He and Wei (2004) utilized the TOE framework to develop a model for exploring the *driving factors affecting the organizational adoption of KMS*. Then they used a medical company as the exploratory case to understand the influential effects of these driving factors. The technological factors include relative advantage, complexity, and compatibility. The organizational factors are management support, company structure, and corporate culture. The environmental factors are competitors' pressure and requirements from business partners.

Lee et al. (2009) drew upon technology diffusion theory, TOE framework and Chinese Confucian culture, and developed an integrated model for the *KMS diffusion processes of Chinese enterprises*. The model proposed seven factors that may have different influences on the KMS diffusion processes. These factors are organizational IT competence, KMS compatibility, KMS complexity, KMS relative advantage, lack of cross-department interaction, the opinion and behavior of top management, and the “Guanxi” and “Renqing” culture. This study suggested that there may be some similar and some different influential factors during the KMS diffusion processes. The KMS diffusion model and hypotheses are the main contributions of this study. Empirical data will be needed to test the model and hypotheses.

Alatawi, Dwivedi, and Williams (2013) used the TOE framework

Table 2
Prior studies on the TOE framework.

Studies	Context	Independent variables	Dependent variables	Key findings
Chau and Tam (1997)	Open systems	• **T:** Perceived benefits, Perceived barriers (PBR), Perceived importance • **O:** Complexity of IT infrastructure, Satisfaction with existing systems (SA), Formalization on system development and management • **E:** Market uncertainty	Likelihood to adopt (LA)	PBR → LA, SA → LA
Teo et al. (1997–8)	Internet	• **T:** Compatibility (CM), Relative advantage (RA) • **O:** Technology policy (TP), Top management support (TMS), Management risk position • **E:** Competitive intensity, Information intensity, Government support	Decision to adopt the Internet (DA)	CM → DA, RA → DA, TP → DA, TMS → DA
Kuan and Chau (2001)	EDI	• **T:** Direct benefits (DB), Indirect benefits • **O:** Financial cost (FC), Technical competence (TC) • **E:** Industry pressure (IP), Government pressure (GP)	Adoption (AD)	DB → AD, FC → AD, TC → AD, IP → AD, GP → AD
Zhu, Kraemer, and Xu (2003)	E-business	• **T:** Technology competence (TC) • **O:** Firm Scope (FC), Firm size (FS) • **E:** Consumer readiness (CR), Competitive pressure (CP), Lack of trading partner readiness (TPR)	Intention to adopt (IA)	TC → IA, FC → IA, FS → IA, CR → IA, CP → IA, TPR → IA
Gibbs and Kraemer (2004)	E-commerce	• **T:** Technology resources (TR) • **O:** Perceived benefits (PB), Organizational compatibility, Financial resources (FC), Firm size • **E:** External pressure (EP), Government promotion (GP), Legislation barriers (LB)	Scope of e-commerce use (SC)	TR → SC, PB → SC, FC → SC, EP → SC, GP → SC, LB → SC
Zhu, Kraemer et al. (2006)	E-business	• **T:** Technology readiness (TR), Technology integration (TI) • **O:** Firm size (FS), Global scope, Managerial obstacles (MO) • **E:** Competition intensity (CI), Regulatory environment (RE)	Initiation (IN), Adoption (AD), Routinization (RO)	TR → IN, TI → IN, MO → IN, CI → IN, RE → IN, TR → AD, TI → AD, FS → AD, CI → AD, TR → RO, TI → RO, FS → RO, MO → RO, CI → RO, RE → RO
Lin and Lin (2008)	E-business	• **T:** IS infrastructure (ISI), IS expertise (ISE) • **O:** Compatibility, Expected benefits (EB) • **E:** Competitive pressure (CP), Trading partner readiness (TPR)	Internal integration (II), External integration (EI)	ISI → II, ISE → II, EB → II, CP → II, ISI → EI, ISE → EI, EB → EI, CP → EI, TPR → EI, II → EI
Wang, Wang, and Yang (2010)	RFID	• **T:** Relative advantage, Complexity (CX), Compatibility (CM) • **O:** Top management support, Firm size (FS), Technology competence • **E:** Competitive pressure (CP), Trading partner pressure (TPP), Information intensity (II)	Adoption (AD)	CX → AD, CM → AD, FS → AD, CP → AD, TPP → AD, II → AD
Cao, Baker, Wetherbe, and Gu (2012)	RFID	• **T:** Benefits of RFID (BR), Barriers of RFID (BAR), IT competence (IC) • **O:** IT infrastructure complexity (ITC), Satisfaction with existing system (SA), Financial resources (FR) • **E:** Market uncertainty (MU)	Adoption (AD)	BR → AD, BAR → AD, IC → AD, ITC → AD, SA → AD, FR → AD, MU → AD

Table 2 (*continued*)

Studies	Context	Independent variables	Dependent variables	Key findings
Yoon and George (2013)	Virtual world	• **T:** Relative advantage, Compatibility, Security concern • **O:** Top management support, Organization size, Organization readiness (OR), Firm size • **E:** Mimetic pressure-competitors (MP), Coercive pressure- customers, Normative pressure (NP), Intensity of competition	Intention to adopt (IA)	OR → IA, MP → IA, NP → IA,
Hung, Chang, Lin, and Hsiao (2014)	Website	• **T:** Awareness (AW) • **M:** Senior executive commitment (SC) • **O:** Corporate website governance (CG), Human resource (HR), Enterprise Resource (ER), Technological resource (TR) • **E:** Government e-readiness (GR), Market force e-readiness (MR), Supporting industry e-readiness (SR), Consultant support	Intention to Accept (IA), Degree of Implementation (DI)	AW → IA, ER → IA, TR → IA, GR → IA, MR → IA, SR → IA, AW → DI, SC → DI, CG → DI, HR → DI, TR → DI, GR → DI, MR → DI

Note. T: Technology, O: Organization, E: Environment, M: Management.

as the theoretical base and proposed a conceptual model for investigating the *factors influencing the KMS adoption in Saudi Arabian public sector*. This study proposed 21 hypotheses that can be related to KMS adoption intention and behavior in the public sector. Empirical data will be needed to test the model and hypotheses.

Wong (2005) reviewed prior KMS studies and proposed *11 critical success factors (CSFs) of implementing KM for small and medium enterprises*. The factors are management leadership and support, culture, information technology, strategy and purpose, measurement, organizational infrastructure, processes and activities, motivational aids, resources, training and education, and human resource management. This study also conducted a questionnaire survey to justify the appropriateness of the proposed CSFs. The usable respondents of this study are 18 academics, consultants, and practitioners. More sample size will be needed to generalize the findings.

Akhavan, Jafari, and Fathian (2005) analyzed *the failure factors of KMS implementation* from a pharmacist company. The failure factors include lack of top management commitment and support, improper selection of knowledge team leader and members, improper planning, lack of separate budget for knowledge management project, organizational culture, lack of cooperation between team members and employees, and resistance against the change.

Focused on Malaysian ICT companies, Chong (2006) identified *11 KM CSFs* and examined the importance, the level of implementation and differences. These factors are employee training, employee involvement, teamworking, employee empowerment, top management leadership and commitment, information systems infrastructure, performance measurement, knowledge-friendly culture, benchmarking, knowledge structure, and elimination of organizational constraints. The results supported that all the 11 CSFs were perceived important for successful KM implementation. This study suggested that future research could include more various industries to ensure generalization.

Akhavan, Jafari, and Fathian (2006) conducted a qualitative analysis from six successful organizations in KMS implementation. They induced three layers and *16 CSFs during the KMS design and implementation phase*. The interior layer includes knowledge architecture, knowledge strategy, knowledge sharing, knowledge storage, and knowledge identification. The middle layer consists of business process reengineering, pilot, organizational structure, and training programs. The outer layer includes organizational culture, transparency, CEO support, and trust.

Nevo and Chan (2007) utilized the Delphi technique that consisted of 21 panel members, and identified *8 KMS success factors*. These factors are ease of use, value and quality of the knowledge, system accessibility, user involvement, integration, top management support/commitment, project manager and team skills, and incentives.

Kuo and Lee (2011) analyzed *the determinants affecting knowledge seekers' intention to use KMS*. They argued the usage is one of the KMS CSFs. This study found that perceived usefulness, perceived ease of use, and compatibility had significantly direct effects on KMS intention. These three variables are also key innovation characteristics suggested by IDT.

Heaidari, Moghimi, and Khanifar (2011) collected 52 managers' responses and concluded *Top 10 CSFs in implementing KMS* in the agricultural sector. These CSFs are culture, senior managers, teamwork, empowerment, performance measurement, training, involvement, information system, benchmarking, and knowledge structure.

Drawing upon IDT and the organizational capability literature, Lin (2013) analyzed the *KMS adoption intention* at the pre-adoption stage and *continue-to-use intention* at the post-adoption stage. This study found that organizational readiness and expected benefits and organizational learning capability had significant effects on intention. This study also supports that technological and organizational contextual variables have influences on adoption and continuance intention.

Based on the foregoing review of the literature, three particular insights were drawn. First, there is more prior research related to KMS implementation that is concentrated on the post-adoption stage. How to successfully implement KMS, i.e. CSFs, is the main purpose and contribution of these studies. Few studies focused on pre-adoption of KMS and utilized an empirical survey method to analyze firms' decisions about whether to implement KMS. Second, there are some similar and some different critical factors during the

KMS implementation stages. The both technological and organizational factors are important at both the pre-adoption and post-adoption stages. These influences are internal factors that can be controllable by organizations. However, external influences such as environmental factors have effects on KMS adoption. They can facilitate or inhibit the KMS implementation decision. But environmental factors are not taken into account for CSFs since organizations have little control over them when implementing KMS. Third, the literature related to KMS adoption has mainly focused on general conceptual principles or case studies. There is a general scarcity of models and frameworks based on cumulative empirical surveys for analyzing and explaining the determinants why firms implement KMS. There is a need to seek to fill the void in research on generalized determinants of KMS implementation across various industries based on the empirical survey.

3. Research model and hypotheses

The research model draws its foundation from IDT and the TOE framework while accounting for KMS features and insights from studies on IT implementation (see Fig. 2). In this model, KMS implementation was the dependent variable since it is an outcome variable and adequately captures whether firms have implemented KMS. We regard implementation as a dichotomous variable; that is, firms either have, or have not implemented the KMS in the survey period.

The model consists of eight factors that are hypothesized to have a direct effect on firms' implementation of KMS. As this study focuses on identifying determinants that can predict the category of a firm (i.e. implementer or non-implementer of KMS), the interrelationships among the eight factors are not considered.

3.1. Technology innovation context

3.1.1. Perceived benefits

Perceived benefits refer to the anticipated advantages of KMS to a business (Chweols et al., 2001). This construct and relative advantage (Rogers, 1983) are largely indistinguishable. Perceived benefits are an important facilitator of innovation implementation (Gibbs & Kraemer, 2004; Grover, 1993; Kuan & Chau, 2001; Lee & Kim, 2007; Tornatzky & Klein, 1982). KMS is an information system developed to support and enhance organizational processes of knowledge creation, storage and retrieval, distribution, and application. An effective KMS helps maximize the use of organizational knowledge resources to a firm's benefit (Kuo & Lee, 2011). A KMS can facilitate distinct approaches to innovation. Overall, firms which perceive higher benefits are more likely to implement KMS. Therefore, the following hypothesis is proposed:

H1. Perceived benefits have a positive effect on KMS implementation.

3.1.2. Complexity

Complexity refers to the degree to which an innovation is perceived as difficult to understand and use (Rogers, 1983). When users perceive that an innovation is complex and challenging, then this lowers the chance of it being adopted and implemented. Complexity, therefore, usually associates negatively with successfully technology implementation (Premkumar & Roberts, 1999; Premkumar, Ramamurthy, & Nilakanta, 1994; Tornatzky & Klein, 1982). Nevo and Chan’s (2007) Delphi study shows that ease-of-use and accessibility are important factors that influence KMS implementation. As KMS is not a stand-alone application but has to be integrated with all aspects of the business, it requires time and resources to understand, specify and develop the system. Therefore, the following hypothesis is proposed:

H2. Complexity has a negative effect on KMS implementation.

3.1.3. Compatibility

Compatibility is the extent to which an innovation is perceived as consistent with the work styles, values, experiences, and existing practices of the potential implementers (Karahanna, Agarwal, & Angst, 2006; Rogers, 1983). Compatibility has a positive influence on organizational innovation implementation (Wang et al., 2010). In contrast with information processing that is the main function of

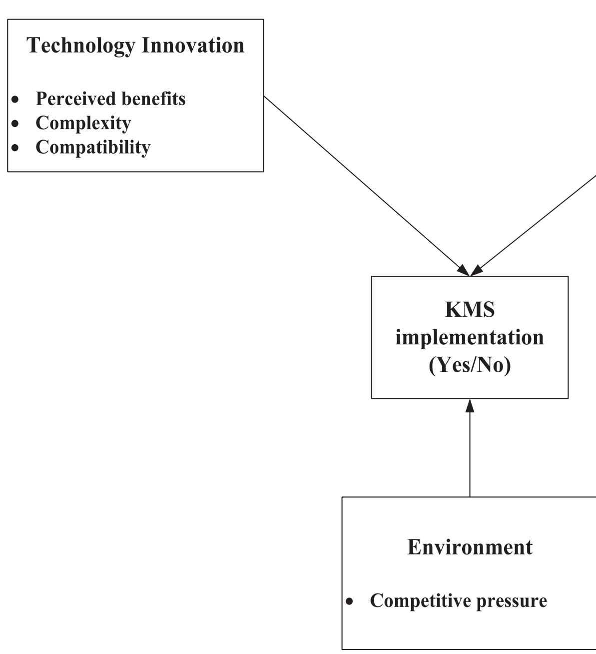

Fig. 2. The research model for KMS implementation in firms.

traditional enterprise systems, the main functions of KMS are storage, communications, and mapping. Implementing KMS is an innovative challenge for most firms as they require new expertise, practices, and information tools. Lack of compatibility may result in organizational resistance to implement the KMS. Therefore, the following hypothesis is proposed:

H3. Compatibility has a positive effect on KMS implementation.

3.2. Organization context

3.2.1. Sufficient resources

Sufficient resources refer to the degree to which related resources for implementing an innovation are perceived to be plentiful and sound. These resources include financial, technical, and human aspects (Hung et al., 2014; Yoon & George, 2013). When a firm has sufficient resources, the firm will have the ability to experiment with innovations while absorbing the associating risks (Sharma & Rai, 2003). Some research (Holsapple & Joshi, 2000; Wong, 2005) also argued sufficient resources are an important concern for KM implementation. Therefore, the following hypothesis was proposed:

H4. Sufficient resources have a positive effect on KMS implementation.

3.2.2. Technology competence

Technology competence, also called technological readiness, refers to the extent to which an organization perceives it has the capability to integrate its technology-related infrastructure, professionals, expertise, and skills for innovative technology implementation (Gibbs & Kraemer, 2004; Zhu, Dong et al., 2006; Zhu, Kraemer et al., 2006). When a firm considers it lacks technology competence, it postpones implementation of the innovative technology in question (Thong, 1999). Firms, generally, with more technical knowledge and skills are likely to implement successfully technology innovations (Kuan & Chau, 2001; Zhu et al. 2003). This anticipates that firms with greater technology competence will be in a better position to implement KMS. This leads to:

H5. Technology competence has a positive effect on KMS implementation.

3.2.3. Top management support

Top management support refers to the extent to which senior executives provide the necessary involvement, resources, and authority for the innovation implementation (Wang, Yuan, Wang, & Archer, 2006). Top management support is recognized as an important determinant that affects innovation implementation in organizations (Grover, 1993; Jeyaraj, Rottman, & Lacity, 2006). The implementation of a KMS not only means developing an information system but also changing the organizational philosophy about knowledge activities. Firms, consequently, have to reshape and redefine knowledge-related interactions among people and systems (Zaman, Mahtab, & Rizvi, 2014). Accordingly, the following hypothesis is proposed:

H6. Top management support has a positive effect on KMS implementation.

3.2.4. Organizational culture

Organizational culture is an important concern in the deployment of KMS (Alavi & Leidner, 1999). An organization culture with positive orientation toward knowledge facilitates employees' willingness to share their knowledge and ideas (Maier, 2004). Organizational cultures, conversely, with a lack of trust, rigid regulations and heavy formalization may hinder knowledge management practices (Holsapple, 2003). Therefore, the organizational culture may facilitate or hinder the organization's KMS implementation. This leads to the following hypothesis:

H7. Organizational culture has an effect on KMS implementation.

3.3. Environment context

3.3.1. Competitive pressure

Studies find that competitive pressure increases the likelihood of innovation implementation (Gibbs & Kraemer, 2004; Yoon & George, 2013; Zhu et al., 2003). When a firm's dominant partners or competitors have implemented an innovation, the firm may feel pressurized to implement the innovation to maintain competitive parity. Knowledge and its application are regarded as the primary source of a firm's competitive advantage (Holsapple, 2003). By implementing KMS, firms can manage effectively knowledge activities such as creation, transfer, and application (Alavi & Leidner, 2001). This leads to our next hypothesis:

H8. Competitive pressure has a positive effect on KMS implementation.

4. Research methodology

4.1. Construct measures

The measurement items in this study were drawn from existing instruments and modified to reflect the specific KMS context. Four items pertaining to perceived benefits were taken from He, Qiao, and Wei (2009) and Wu and Wang (2006). These items reflect the anticipated advantages to a firm of implementing KMS. Complexity was measured by three items from Grover (1993) and Karahanna, Straub, and Chervany (1999) that related to how easy the KMS was to develop, learn and use. Compatibility was measured by four items that focused on the extent to which the KMS was perceived as consistent with the existing work style, information infrastructure, KM practices, and experiences with information systems. The items were taken from Grover (1993) and Taylor and Todd (1995). Items drawn from Grandon and Pearson (2004) and Wong (2005) measured perceptions of the sufficiency of financial, technical, and human resources to implement the KMS. Five items related to technology competence were adapted from Lin (2006) and Kuan and Chau (2001). The items reflect the extent to which a firm perceives its technology-related competences enable KMS implementation. Top management support was operationalized by three items based on Lin (2006) and Teo et al. (1997–8). Organizational culture was measured by three items adapted from Davenport, DeLong, and Beers (1998). These items reflect the fit between organizational culture and knowledge management practices. Competitive pressure was measured by three items that reflected the degree of competitive rivalry among competitors, partners, and the industry (Grandon & Pearson, 2004; Lin, 2006).

A five-point Likert scale was used to measure all items (1 = *strong disagree* and 5 = *strongly agree*) except those related to complexity. The complexity items were reverse-coded (i.e., higher values meant *less* complexity). Table 3 summarizes the measurement items of the independent variables.

The main objective of this study is to identify the determinants that can significantly influence and distinguish whether firms

Table 3
Measurement items of the independent variables.

Measurement items
Perceived benefits
PB1. Using KMS will improve the job efficiency of the employees in my company.
PB2. Using KMS will help the employees of my company acquire new knowledge and innovative ideas.
PB3 Using KMS will help the employees of my company effectively manage and store knowledge that they need.
PB4. Using KMS will improve the job effectiveness of the employees in my company.
Complexity
CX1. It is easy for employees to use the KMS in my company.
CX2. It is easy to develop the KMS for my company.
CX3. It is easy for employees to learn to operate the KMS in my company.
Compatibility
CM1. KMS fits with the existing working style of my company.
CM2. KMS is compatible with existing information infrastructure.
CM3. KMS is compatible with my company's KM practices.
CM4. KMS development is compatible with my firm's existing experiences with information systems.
Sufficient resources
SR1. My company has sufficient financial resources to implement the KMS.
SR2. My company has sufficient technical resources to implement the KMS.
SR3. My company will give the staff responsible for implementing KMS sufficient time and resources.
Technology competence
TC1. My company contains a high level of IT-related acceptance.
TC2. The information technology abilities of the employees in my company are good.
TC3. Both experience of information technology and the infrastructure of my company are available to support KMS-related applications.
TC4. The IT expertise in my company is good.
TC5. My organization contains a high level of KMS-related knowledge.
Top management support
TS1. My top management would think that my company should implement KMS.
TS2. My top management supports adequate time and resource allocations for the KMS implementation.
TS3. My top management considers KMS important.
Organizational culture
OC1. My company encourages employees to share their knowledge.
OC2. My company encourages employees to propose innovative ideas.
OC3. My company has channels for facilitating knowledge dissemination.
Competitive pressure
CP1. Our industry is pressuring my company to implement KMS.
CP2. Most of my firm's important business partners are already using KMS.
CP3. My company could have experienced a competitive disadvantage if the KMS had not been implemented.

implement KMS or not. Following the prior studies related to IS/IT adoption (Chau & Tam, 2000; Grover, 1993; Kuan & Chau, 2001; Teo et al., 1997–8), a dichotomous measure rather than a continuous measure was used for assessing the dependent variable, implementation. The construct was operationalized via a yes or no response to the question, “Has my company implemented a knowledge management system?” (i.e., 0 = *not-implemented*, 1 = *implemented*).

4.2. Data collection and sample profile

Data for this study were collected using a questionnaire survey administered in Taiwan. The questionnaire consisted of three parts. The cover letter explained the objective of this study and described the KMS. The first part contained questions about business background information. The second part included items that assessed the eight factors affecting KMS implementation. The final part asked whether the company had implemented. A sample of firms was drawn from the Top-1000 firms in Taiwan based on sales volumes (Common-Wealth Magazine, 2006). Table 4 shows the sample profile. This study received 291 valid responses. Among the valid responses, 178 (61.2%) of firms had implemented. Overall, the sample represented a wide range of firms thereby increasing the applicability of the results.

4.3. Statistical techniques for data analysis

In order to analyze the collected data, a two-phased approach, based on Kuan and Chau (2001), was employed.

First, confirmatory factor analysis (CFA) was used to examine the overall fit, reliability and validity of the measurement model. The process of CFA was supported by the use of AMOS 18.0. Convergent validity was assessed by examining standardized factor loadings, the average variance-extracted (AVE), and construct reliabilities (i.e., Cronbach's alpha and composite reliability). Nine common model-fit measures were used to assess the model's overall goodness of fit: normed χ^2 (χ^2/df), goodness-of-fit (GFI), adjusted

Table 4
Sample profile.

Category	Percentage
Industry	
• Manufacturing	28.2%
• Services	39.9%
• Financing	9.6%
• Others	22.3%
Employee number	
• ≦100	8.9%
• 101–500	19.6%
• 501–1000	15.1%
• 1001–5000	40.9%
• ≧5001	15.5%
Company age (years)	
• ≦15	16.5%
• 16-25	36.4%
• 26–35	15.4%
• ≧36	31.6%
KMS implementation	
• Yes	61.2%
• No	38.8%

goodness-of-fit (AGFI), root mean square residual (RMSR), normalized fit index (NFI), non-normalized fit index (NNFI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR).

Second, the hypotheses were tested using logistic regression. Since the dependent variable was dichotomous (i.e., implementer and non-implementer), the logistic regression technique was reasonable. The SPSS 18.0 statistical software package was used for the analyses. The equations for the logistic regression are as follows (Field, 2009).

$$P(Y) = \frac{1}{1 + e^{-\left(B_0 + \sum_{i=1}^{n} B_i X_i\right)}} \quad (1)$$

$$odds = \frac{P(Y)}{1 - P(Y)} \quad (2)$$

In equation (1) P(Y) is the probability of Y occurring (i.e., KMS implementation), e is the base of natural logarithms, β_0 is intercept, and β_i is the regression coefficient of predictor variable X_i. In equation (2), the odds is the ratio of the probability of Y occurring (i.e., KMS implementation) divided by the probability of Y not-occurring (i.e., KMS not-implemented).

The multicollinearity, and the overall goodness-of-fit and Wald statistics of the logistic regression model were assessed in the phase.

Table 5
Convergent validity of the CFA results.

	Factor loading	S. E.	t value
Perceived benefits (Cronbach's α = 0.87; composite reliability = 0.87; AVE = 0.64)			
PB1	0.88	N/A	N/A
PB2	0.78	0.05	15.72
PB3	0.81	0.06	16.47
PB4	0.71	0.06	13.58
Complexity (Cronbach's α = 0.85; composite reliability = 0.86; AVE = 0.67)			
CX1	0.81	N/A	N/A
CX2	0.74	0.07	13.42
CX3	0.90	0.07	16.36
Compatibility (Cronbach's α = 0.86; composite reliability = 0.86; AVE = 0.61)			
CM1	0.74	N/A	N/A
CM2	0.80	0.08	13.32
CM3	0.82	0.08	13.52
CM4	0.76	0.08	12.50
Sufficient resources (Cronbach's α = 0.92; composite reliability = 0.92; AVE = 0.79)			
SR1	0.88	N/A	N/A
SR2	0.94	0.04	23.59
SR3	0.84	0.05	19.29
Technology competence (Cronbach's α = 0.91; composite reliability = 0.91; AVE = 0.72)			
TC1	0.79	N/A	N/A
TC2	0.85	0.07	16.29
TC3	0.90	0.07	17.52
TC4	0.84	0.07	16.14
Top management support (Cronbach's α = 0.93; composite reliability = 0.93; AVE = 0.82)			
TS1	0.90	N/A	N/A
TS2	0.92	0.04	24.37
TS3	0.90	0.04	23.13
Organizational culture (Cronbach's α = 0.87; composite reliability = 0.87; AVE = 0.70)			
OC1	0.88	N/A	N/A
OC2	0.87	0.05	18.63
OC3	0.75	0.05	15.13
Competitive pressure (Cronbach's α = 0.80; composite reliability = 0.80; AVE = 0.57)			
CP1	0.85	N/A	N/A
CP2	0.75	0.07	12.82
CP3	0.66	0.07	11.20

Table 6
The square roots of AVEs and correlations among latent constructs.[a]

	PB	CX	CM	SR	TC	TS	OC	CP
PB	*0.80*							
CX	0.53	*0.82*						
CM	0.63	0.68	*0.78*					
SR	0.56	0.55	0.71	*0.89*				
TC	0.64	0.66	0.74	0.81	*0.85*			
TS	0.55	0.56	0.69	0.71	0.73	*0.91*		
OC	0.51	0.50	0.62	0.70	0.64	0.66	*0.84*	
CP	0.43	0.50	0.62	0.59	0.66	0.68	0.66	*0.76*

Note. PB = perceived benefits; CX = complexity; CM = compatibility; SR = sufficient resources; TC = technology competence; TS = top management support; OC = organizational culture; CP = competitive pressure.

[a] The square roots of AVE are presented in italics on the diagonal. Correlation coefficients are on the off-diagonal.

5. Data analysis and results

5.1. Measurement model

CFA was used to examine the measurement model. The standardized factor loadings of the measurement items on their respective constructs should be greater than 0.6 (Bagozzi & Yi, 1988). Based on this cut-off, one item (TC5) was removed and this left a total of 27 items for further analysis. Table 5 summarizes the results of convergent validity tests. The standardized factor loadings for all items exceed the threshold level of 0.6. Both the Cronbach's alpha coefficients and the composite reliabilities exceed the recommended level of 0.7 (Hair, Anderson, Tatham, & Black, 2006). The AVE estimates for all the constructs are above 0.5 (Bagozzi & Yi, 1988). These results demonstrate the convergent validity.

Discriminant validity is the extent to which a construct is truly distinct. Fornell and Larcker (1981) suggest that the square roots of AVEs for any two constructs should be greater than the correlation between these two constructs. Table 6 shows that the values on the diagonal exceed the inter-correlations thereby indicating acceptable discriminant validity.

Table 7 shows that all the model-fit indices exceed their respective common acceptable levels (e.g., Chau & Hu, 2001; Hadjistavropoulos, Frombach, & Asmundson, 1999; Hair et al., 2006). The measurement model, therefore, exhibits a good fit with data collected and provides a satisfactory representation of the underlying structure of the measures.

5.2. Empirical results and hypotheses testing

The composite scores of the eight factors were calculated by

Table 7
Goodness-of-fit indices for the measurement model.

Fit Indices	Criteria	Outcome
χ^2/df	<3	2.16
Goodness-of-fit (GFI)	>0.85	0.86
Adjusted goodness-of-fit (AGFI)	>0.80	0.82
Root mean square residual (RMSR)	<0.05	0.03
Normalized fit index (NFI)	>0.80	0.90
Non-normalized fit index (NNFI)	>0.80	0.88
Comparative fit index (CFI)	>0.90	0.94
Root mean square error of approximation (RMSEA)	<0.08	0.06
Standardized root mean square residual (SRMR)	<0.10	0.05

Table 8
Means and standard deviations of all the independent variables.

Factors	Overall		Implementer		Non-implementer		T value
	Mean	SD	Mean	SD	Mean	SD	
Perceived benefits	3.60	0.83	3.94	0.49	3.06	0.95	9.16***
Complexity[a]	2.68	0.81	2.35	0.59	3.21	0.82	−9.70***
Compatibility	3.53	0.71	3.83	0.54	3.06	0.69	10.67***
Sufficient resources	3.45	0.90	3.83	0.58	2.86	0.98	9.52***
Technology competence	3.52	0.88	3.88	0.55	2.96	1.01	8.86***
Top management support	3.52	0.92	3.99	0.59	2.78	0.87	13.02***
Organizational culture	2.78	0.68	3.07	0.54	2.31	0.61	11.09***
Competitive pressure	3.40	0.81	3.71	0.55	2.91	0.60	11.72***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] *Note*. A low score means low complexity.

Table 9
Multicollinearity diagnostics: VIF and tolerance.

	PB	CX	CM	SR	TC	TS	OC	CP
VIF	1.67	1.74	2.02	2.36	2.39	2.70	1.80	1.77
Tolerance	0.60	0.58	0.50	0.42	0.42	0.37	0.56	0.57

Note. PB = perceived benefits; CX = complexity; CM = compatibility; SR = sufficient resources; TC = technology competence; TS - top management support; OC = organizational culture; CP = competitive pressure.

averaging the original item scores. Table 8 shows the means and standard deviations of the eight factors by overall, implementer, and non-implementer samples. The *t*-test was used to compare the mean differences between these two subsamples. The KMS implementers have significantly higher levels of perceived benefits, compatibility, sufficient resources, technology competence, top management support, organizational culture, and competitive pressure; while the non-implementers report a higher level of concern on complexity. In addition, the standard deviations of the eight factors in the implementer subsample are lower than the non-implementer subsample. The implementers have more consistent perceptions about the eight potential factors.

The variance inflation factor (VIF) and tolerance values were examined to diagnose if multicollinearity was an issue in this study. Table 9 shows that all VIFs are below the threshold value of 10 and all tolerance values are above 0.1 (Hair et al., 2006). Therefore, multicollinearity does not pose a serious problem in this study.

The overall goodness-of-fit of the logistic regression model was assessed in four ways (Hair et al., 2006). First, a difference assessment of −2 log likelihood (-2LL) values between the null model and the research model was examined. The null model used just the mean of the dependent variable as a baseline for comparison. The lower -2LL value is the best fitting model (Table 10) (Hair et al., 2006). The Chi-square statistic for the reduction in the -2LL value is 218.79 (i.e., 388.77−169.98) and the corresponding p-value is lower than 0.001. This indicates that the logistic regression model is superior to the null model.

Second, the Hosmer and Lemeshow test was used. The test partitions the sample data into 10 equal-sized groups and examines the correspondence of the observed and predicted frequency probabilities. The Hosmer and Lemeshow χ^2 statistic is 6.85 and the significance level is 0.55. A non-significant value, as we report, indicates an acceptable model fit.

Third, the two Pseudo-R^2 measures were used to assess the association between the independent variables and dependent variable. The values of Cox and Snell R^2, and Nagelkerke R^2 are 0.53 and 0.72, respectively. The values indicate that the logistic regression model accounts for at least fifty percent of the variation in the dependent variable.

The fourth assessment of the overall goodness-of-fit of the logistic regression model was the classification accuracy. Table 10 shows the model correctly predicts 91.0% of the implementers and 80.5% of the non-implementers for an overall accuracy rate of 86.9%. These three accuracy ratios exceed the 50% level and so ensure that the prediction model has good discriminating power.

We tested the hypotheses with the Wald statistics. This approach examined the significance of the regression coefficients. A two-tailed p value < 0.05 was considered statistically significant. Table 11 shows six factors (perceived benefits, complexity, compatibility, top management support, organizational culture, and competitive pressure) are significant predictors of KMS implementation. Two organizational factors (i.e., sufficient resources and technology competence) are non-significant.

The sign of the logistic regression coefficient (β) indicates whether the independent variable has a positive or negative effect on organizational KMS implementation. Our results infer that for KMS implementation: first, perceived benefits, compatibility, top management support, organizational culture, and competitive

Table 10
Overall goodness-of-fit results for the logistic regression model.

(1) Overall goodness-of-fit measure

Statistics	Values	Significance
$-2LL_{null\ model}$	388.77	
$-2LL_{research\ model}$	169.98	
Change in −2LL	218.79	0.000
Hosmer and Lemeshow χ^2	6.85	0.55
Cox and Snell R^2	0.53	
Nagelkerke R^2	0.72	

(2) Classification accuracy

Actual	Predicted		% Correct
	Implementer	Non-implementer	
Implementer	162	16	91.0
Non-implementer	22	91	80.5
Overall			86.9

Table 11
Parameter estimate results of the logistic regression analysis.

Predictor	β coefficient	SE	Wald statistic	Exp(B)
Perceived benefits	0.712*	0.29	5.89	2.04
Complexity	−1.06**	0.36	8.58	0.35
Compatibility	1.13**	0.44	6.70	3.10
Sufficient resources	0.44	0.34	1.70	1.55
Technology competence	-0.40	0.30	1.76	0.67
Top management support	1.01**	0.36	9.19	3.00
Organizational culture	0.96*	0.41	5.47	2.61
Competitive pressure	1.38***	0.41	11.43	3.97

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

pressure are enablers; second, complexity is an inhibitor.

6. Discussion

The findings demonstrate the appropriateness of integrating the IDT and the TOE framework to explain the determinants of firms' decision towards implementing KMS. As the results show significant determinants rest within the TOE framework, this indicates that the decision to implement KMS is not only a technical question but also relates to issues of internal organization and factors within external environment. The next sections discuss the significance of these determinants for KMS implementation:

6.1. Technology innovation context

In the technology innovation context, perceived benefits, complexity, and compatibility act as significant determinants of a firm's decision to implement KMS. These three factors align with the innovation characteristics the IDT proposes (Rogers, 1983). The effects of these three technological determinants are consistent with the expectations.

First, perceived benefits have a positive effect on KMS implementation. It is reasonable for firms to consider whether an innovation will yield greater benefits than current practice. Our findings show that the perceived benefits are perceived to be greater for implementers, as compared to non-implementers. When a firm recognizes that a KMS can contribute to the efficiency and effectiveness of their knowledge management practices then they are more likely to implement KMS.

Second, complexity has a significant and negative influence on KMS implementation. KMS is more complicated and difficult to implement than traditional general-purpose information systems (Barnes, 2002; Woodman & Zade, 2012). To develop KMS requires seamlessly integrating a variety of IT tools, including database management systems, communication and messaging, and browsing and retrieval (Alavi & Leidner, 1999). Furthermore, it is not easy to clearly identify and predict the inputs and outputs of KMS (Woodman & Zade, 2012). In KMS, knowledge is usually stored and processed in unstructured ways as opposed to the structured modes of transactional enterprise systems (Bernard, 2006). This phenomenon underlies the relatively high complexity in developing KMS. Moreover, Many studies also argue that perceived ease of use and speed to learn KMS is an important factor that affects KMS implementation and success (Quaddus & Xu, 2005; Xu & Quaddus, 2012). Poor design of the user interface, difficulty in operating, and inefficiency searches inhibit to KMS implementation (Damoderan & Olphert, 2000). Therefore, the complexity is an important barrier to KMS implementation for businesses.

Not surprisingly, compatibility is found to be a significant facilitator of KMS implementation. When there is a good fit between a technological innovation and the practices of the implementing firm, users have positive attitudes and agreement about the technological innovation (Kuo & Lee, 2011). This makes it easy to introduce, interpret, and diffuse the innovation to the whole organization. This makes it more likely that the firm will implement an innovation. The main purpose of KMS is to support knowledge creation, transfer, dissemination, and application in organizations (Alavi & Leidner, 2001). If KMS functions are consistent with the work styles, needs, and practices of organizational knowledge activities, a positive impression of KMS is likely to occur and this, in turn, can facilitate KMS implementation. Therefore, compatibility is positively related to KMS implementation.

6.2. Organization context

The findings show that top management support is a key determinant of KMS implementation. The finding is consistent with prior KM and IT innovation implementation literature (Davenport et al., 1998; King, Marks, & McCoy, 2002; Nevo & Chan, 2007; Teo et al., 1997–8). Top management can provide sufficient resources and create a positive organizational climate for KMS implementation (Lin, 2013). Top management can encourage and reward employees to donate and collect knowledge. The knowledge sharing culture in an organization will affect employees to use KMS and then influence the effectiveness of the system. Furthermore, top management support can reduce resistance, resolve conflicts, improve communications, convince employees, and overcome implementation barriers (Sharma & Yetton, 2003). Therefore, top management support is positively related to KMS implementation.

Organizational culture has a significant effect on KMS implementation. The finding is consistent with prior KM-related studies (Damoderan & Olphert, 2000; Davenport et al., 1998; King et al., 2002; Quaddus & Xu, 2005). KMS implementation is not just a technical issue, the change and congruence of organizational culture for knowledge sharing and learning is an important concern in the deployment of KMS (Alavi & Leidner, 1999; Desouza, 2003). A organizational culture with a positive orientation to knowledge demonstrates: (1) people are willing and free to explore; (2) executives encourage employees to create, disseminate, and use knowledge; (3) people are not inhibited in sharing knowledge; and (4) people are rewarded for innovation and learning (Davenport et al., 1998; DeLong & Fahey, 2000). On the contrary, a knowledge-unfriendly organizational culture acts as a serious barrier to the KMS implementation and use (Damoderan & Olphert, 2000; King & Marks, 2008).

Finally, we find that the organizational characteristics of sufficient resources and technology competence do not have any significant direct effect on firms' decision to implement KMS. This may be due to that the fact that most companies realize the importance of IT and are willing to invest resources to develop IT solutions. Furthermore, many IT innovative applications, such as Internet, data mining, and groupware, have been widely used for major business applications. Most businesses have good practices for information system development and good information literacy in their employees. These base levels of knowledge and skill give firms a sufficiency of resources in related technology competences to implement KMS.

6.3. Environment context

Competitive pressure has the most significant influence on KMS implementation. This finding is consistent with the findings in other KM studies. In the present business environments, firms are faced with tremendous, global, and dynamic competitive pressures. Knowledge has become an important strategic resource that underpins firms' long-term competitive differentiator (Barnes, 2002; Holsapple & Joshi, 2000; Wu & Wang, 2006). This motivates firms to implement KM activities.

The purpose of developing KMS is to apply information technologies for supporting and enhancing organizational knowledge management. By using KMS firms gain a powerful source of competitive advantage (Kuo & Lee, 2011). Our study shows that when a firm feels intensive competition then they tend to implement KMS in order to cope with the competitive pressure.

7. Conclusion

Firms attempt to enhance their knowledge management performance by implementing KMS. The implementation of KMS differs, however, from the implementation of traditional enterprise information systems. It is, therefore, important to understand the determinants of firms KMS implementation. Based on the IDT and TOE framework, we developed and validated a research model to examine the influence of eight contextual factors on KMS implementation in businesses. The results not only help top management and information system executives to facilitate KMS deployment, but also provide theoretical foundations for future research. The key findings are as follows:

(1) This study confirms the usefulness of the TOE framework for analyzing whether firms intend to implement KMS. The decision to implement KMS is not just based on the technological factors. Organizational factors and the environmental contexts have also significant influences.
(2) This study also confirms that the three main innovation characteristics from IDT (i.e., perceived benefits, complexity, and compatibility) are important determinants of KMS implementation. These three factors also belong to the technological context of the TOE framework.
(3) In the organizational and environmental contexts, top management support, organizational culture, and competitive pressure are significant determinants of firms' KMS implementation. The organizational factors of sufficient resources and technology competence do not have any significant direct effect on the business decision to implement KMS.
(4) Competitive pressure is the most influential factor on firm's decision to implement KMS. Compatibility is the second most influential predictor of firms' intention towards KMS implementation.

By developing a better understanding of the significant factors that influence firms' KMS implementation, firm mangers can make more accurate decisions and assessments whether their firms can implement KMS. These factors can be utilized as a checklist for firms to assess their readiness of KMS implementation. In addition, managers can also use the findings of this study to effectively maximize their efforts to promote KMS implementation.

The important influential factors of KMS implementation identified by this study were empirically based on the responses of the both implementers and non-implementers of KMS. Therefore, the list of these determinants includes facilitators and inhibitors. The findings of this study are more comprehensive and complete than prior studies that only focused on the firms that had implemented KMS.

This study has several limitations that also represent opportunities for future research. First, this study draws on a sample of 291 firms who are in the Top-1000 list of Taiwan's companies. These firms are likely to have ample resources and IT experience. For this reason, KMS implementation might not be influenced by the organizational characteristics of sufficient resources and technology competence. Thus, caution should be exercised in applying the findings to different countries and contexts. Samples from different locations or company settings should be collected to confirm or refine the findings of this study.

Second, this study used Top-1000 Taiwanese companies listed in Common-Wealth Magazine (2006) as the sampling frame. The company list may have some changes at present. The survey is a self-administered and voluntary. Thus the sample may be biased towards the responders who may have interests or experiences related to the evaluation of KMS implementation and were admitted to participate in the survey.

Third, KMS can enable diverse forms of knowledge management, such as knowledge repositories, knowledge maps, and collaborative tools. Different KMS types have different functionalities, and this may associate with different facilitators and inhibitors. This study did not discriminate between different KMS types but rather placed them all in a single category. Future studies could analyze whether different KMS types associate with different determinants.

Fourth, this study adopted a cross-sectional approach which might not reflect the dynamic processes of technology implementation. Future studies could use longitudinal methods to examine whether and how the determinants vary at different KMS implementation and diffusion stages.

Finally, this study used the dichotomous measure for KMS implementation (i.e. yes/no). Therefore, the logistic regression analysis was employed and only focused on the direct effects of the determinants on KMS implementation. The interrelated relationships among the determinants were not analyzed in this study. Future studies can select different numeric measures that can reflect the extent or outcome of KMS implementation, such as implementation levels (i.e., sophistication), dependability, performance impacts, and routinization. The all dependence relationships can be examined simultaneously. Such studies may provide rich insights and understandings about the interplayed relationships among the KMS contextual factors and implementation outcomes.

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