



# The effects of employee motivation, social interaction, and knowledge management strategy on KM implementation level

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## Abstract

This study examines the influence of employee motivation (intrinsic motivation and extrinsic motivation), social interaction (interpersonal trust, openness in communication, and social reciprocity), and knowledge management (KM) strategy (codification knowledge strategy and personalization knowledge strategy) on KM implementation level. Based on a survey of 243 senior executives from large organizations in Taiwan, this study uses a structural equation modeling approach to investigate the research model. The results showed that employee motivation, social interaction, and KM strategy are closely related to level of KM implementation. However, codification knowledge strategy did not significantly influence KM implementation level. Given the importance of KM implementation in contemporary organizations and also in the future, the findings of this study are designed to enable business managers or policy-makers in formulating policies and targeting appropriate organizational enablers to support effective KM implementation. Implications for KM research and practice are discussed.

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**Keywords:** employee motivation; social interaction; knowledge management strategy; knowledge management implementation; structural equation modeling

## Introduction

In the current highly competitive business environment, knowledge is viewed as a strategic resource that can generate sustainable competitive advantage (Drucker, 1993; Grant, 1996; Teece *et al.*, 1997). Knowledge management (KM) activities are considered a process involving the management of organizational knowledge to meet existing and emerging needs, identifying and exploiting existing knowledge assets and acquiring new ones, and developing new business opportunities (Jarrar, 2002). Consequently, active and effective KM can help organizations solve problems, improve performance, and achieve their strategic objectives. Successful KM implementation is recognized as a key concept for administrative change and innovation (Darroch, 2005; Johannessen, 2008). KM implementation refers to a systematic method of integrating people and processes, enabled by technology, to facilitate the exchange of operationally relevant knowledge and expertise to enhance overall organizational effectiveness (Yahya & Goh, 2002; Marr *et al.*, 2003). One of the critical goals of KM implementation is to achieve a balance between knowledge exploitation and knowledge exploration (Bhatt *et al.*, 2005). Exploiting of existing (explicit) knowledge is useful in a stable

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environment. Environmental changes may reduce the appropriateness of the firm's knowledge base, and hence the firm's ability to create new knowledge and disseminate it throughout the organization (i.e., knowledge exploration) becomes essential.

Although KM implementation and evolution is considered a core competence that organizations use to achieve business success, organizations face several critical challenges. These challenges are identified below (McDermott, 1999; Widen-Wulff & Ginman, 2004).

1. *Human resource challenge*: The human resource challenge facing organizations is to understand employee motives for participating in the development of KM initiatives and how these factors influence level of KM implementation. People are the core of managing organizational knowledge, because employees hold knowledge. Previous researchers have observed that firms can successfully promote KM activities both by directly incorporating knowledge into their business strategy and by changing employee attitudes and behaviors towards participation in KM (Lee & Choi, 2003; Egbu, 2004).
2. *Social challenge*: The social challenge is to build social networks or informal community networks for sharing knowledge. KM occurs through social activities designed to create social networks among members and enhance knowledge sharing and dissemination (O'Dell & Grayson, 1999). Previous studies have shown that without social networks, formal knowledge sharing practices are insufficient to encourage employees to share, contribute and reuse knowledge in work environments (Andrews & Delahay, 2000; Kim & Lee, 2006).
3. *Strategic challenge*: The challenge in KM strategy planning is to develop technology- and human-oriented strategies to facilitate knowledge transfer within the organization. KM strategy is embedded in business strategy, and comprises a technology-oriented strategy for managing explicit knowledge and a human-oriented strategy for managing tacit knowledge (Nonaka & Takeuchi, 1995). Although previous studies have argued that firms follow the codification (technology) or personalization (human) approaches when implementing KM (Hansen *et al.*, 1999; Choi & Lee, 2003), further investigation is required to clarify which KM strategy most influences the evolution of KM implementation.

The solution to the above challenges is having various organizational enablers that determine the effectiveness of KM to the organization, and is the driving force of KM. For example, employees with positive attitudes towards KM share ideas and insights because they see such sharing as natural, rather than as a job requirement (Lin, 2007a). Some scholars consider the introduction of KM to be a type of social activity; therefore, the level of social interaction determines KM success or failure (Sparrowe *et al.*, 2001; Bell, 2005; Brachos *et al.*, 2007).

Moreover, an effective KM strategy requires seeking an appropriate balance between technology and human approaches to stimulate KM growth (Argote *et al.*, 2000; Albino *et al.*, 2004). Despite growing recognition of the importance of employee, social, and KM strategy factors in facilitating KM activities, no prior empirical studies that we know of have directly explored the role of employee, social, and KM strategy factors on the development of KM implementation.

This study aimed to examine the influence of employee motivation (intrinsic motivation and extrinsic motivation), social interaction (interpersonal trust, openness in communication, and social reciprocity), and KM strategy (codification knowledge strategy and personalization knowledge strategy) on KM implementation level. The research model and hypothesized relationships are empirically tested using the structural equation modeling (SEM) approach. Furthermore, the findings of this study provide a theoretical basis and empirical evidence for predicting and explaining which employee, social, and KM strategy factors must be mobilized to achieve a high level of KM implementation. From a managerial perspective, given the importance of KM implementation in contemporary organizations and also in the future, the findings of this study are designed to enable business managers or policy-makers in formulating policies and targeting appropriate organizational enablers to support effective KM implementation.

## Literature review

### Administrative innovation

Administrative innovation denotes new ideas, work processes, and management practices with the capacity to improve performance and boost organizational competitive advantage (ten Bos, 2000). Previous studies argue that individual and organizational learning processes relate to activities intended to both build on existing knowledge and develop new knowledge, thus providing a foundation for administrative innovation (Calantone *et al.*, 2002; Gray, 2006). Nonaka & Takeuchi (1995) point out that administrative innovation depends on organizational knowledge resources, particularly since knowledge involves far more than simply data, information and conventional logic.

Administrative innovation occurs in organizational social system, including organizational structures and administrative processes concerned with employee social interaction (Gopalakrishnan & Damanpour, 1997; Totterdell *et al.*, 2002). Examples of administrative innovation include the introduction of a new human resource practice or a change in employee working practices. Researchers have proposed that KM can be considered an administrative innovation, a new discipline based on identifying a set of KM activities (such as knowledge creation, acquisition, sharing, and utilization) to enable a firm to maximize employee skills and experiences (Scarbrough, 2003; Darroch, 2005; Lin &

Lee, 2006; Lundvall & Nielsen, 2007). KM has the potential to generate new ideas and develop new business opportunities through socialization and learning process of knowledge workers. KM thus significantly impacts business process change, innovation diffusion, and even business performance.

### KM implementation

Recently, numerous researchers have studied KM implementation. For example, based on organizational capabilities of KM (organizational knowledge, knowledge workers, KM processes, and information technology), Lee & Kim (2001) propose a KM stage model encompassing the initiation, propagation, integration, and networking stages. Each of the four stages is differentiated in terms of its management goals, activities, and characteristics of management components. Moffett *et al.* (2003) examine influences on the KM implementation, and found that organizational culture and technological capability are key factors for KM implementation success. Yeh *et al.* (2006) use a case study method to analyze the crucial role that determines the effectiveness of executing KM within the organization. The results demonstrate that top management support, knowledge sharing culture, employee training courses, and digitalization of the documents are key enablers for implementing KM. Arguing that KM can be adapted over time through the dimensions of KM process, KM effectiveness, and social-technical support, Lin (2007b) suggests a KM evolution stage model which consists of three stages: KM initiation, development, and mature stages. Although these studies have provided significant insights into the relationship between various factors and KM implementation, exactly how factors related to employee motivation, social interaction, and KM strategy affect level of KM implementation has received little empirical attention.

### Research model and hypotheses

This study considers KM in terms of administrative innovation (Abou-Zeid & Cheng, 2004), and examines employee motivation, social interaction, and KM strategy influencing KM implementation level. Figure 1 shows the research model, which hypothesized that employee motivation (intrinsic motivation and extrinsic motivation), social interaction (interpersonal trust, openness in communication, and social reciprocity), and KM strategy (codification knowledge strategy and personalization knowledge strategy) affect KM implementation level. Each construct involved in the research model and hypotheses are discussed below.

### KM implementation level

Administrative innovation involves the generation, acceptance, and implementation of new ideas, work processes, and management strategies (van de Ven *et al.*, 1989). According to innovation diffusion theory (Rogers, 1995), the innovation implementation process begins from initial firm awareness and evaluation of

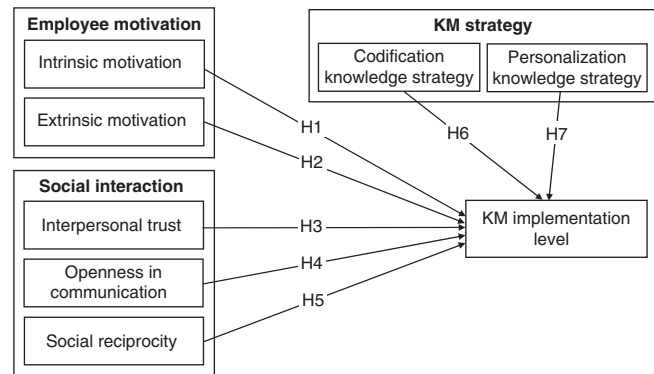


Figure 1 Research model.

administrative innovation. After a new administrative innovation is adopted, it needs to be accepted, adapted, and institutionalized into the firm. The KM implementation process remains incomplete if KM implementation is limited to specific projects and does not result in a widespread transformation of business processes and practices. KM implementation level is a valuable construct that can be used to understand various issues related to KM activities, including expected functional level and the degree of importance an organization needs to attach to certain KM implementation success factors. Based on innovation diffusion theory (Rogers, 1995; Xu & Quaddus, 2005; Gottschalk, 2006) and KM implementation strategy (de Gooijer, 2000; Armistead & Meakins, 2002; Nielsen, 2005; Chang & Li, 2007), this study proposes five levels of KM implementation. These levels are discussed below.

**Level 1 – Initiation:** The first level is an initiation level in which firms begin to recognize the importance of KM and prepare for KM efforts. During this level, firms explore realistic expectations about benefits and costs in fostering KM initiatives.

**Level 2 – Pilot implementation:** Firms may limit the KM implementation to a single function (i.e., production, marketing, R&D), or to a single division, and expand KM implementation into the whole organization after having adequate experience with KM operations. This level enables the organization to incrementally adjust its structure and culture to facilitate successful KM implementation.

**Level 3 – Organic growth:** This level is continually building KM infrastructure to facilitate and motivate KM activities such as acquiring or creating, storing, sharing, utilizing, and protecting knowledge. Most firms at this level encourage employees to share expertise and participate in group problem-solving. This level makes employees understand that sharing knowledge and facilitating KM activities benefits both the organization and themselves.

*Level 4* – Organizational implementation: Firms typically implement KM on an organization-wide basis since KM is a company-wide strategy for managing organizational culture for learning, knowledge sharing, and error avoidance. This level involves introducing KM activities to every corner of an organization, and furthermore expecting all organizational members to participate in KM.

*Level 5* – Institutionalization: This is the highest level of KM implementation. This level represents the steady state in which KM can effectively adapt to change and enhances organizational performance. The application of knowledge for work-related problems becomes a regular day-to-day activity during this level.

#### **Relationship between employee motivation and KM implementation level**

Motivation has been identified as a key determinant of work-related behavior (George & Brief, 1996; Lu, 1999), information technology acceptance behavior (Lee *et al.*, 2005; Fagan *et al.*, 2008), and there is an indication that it is the primary trigger for knowledge sharing behavior (Lin, 2007a). Based on Deci & Ryan's (1985) self determination theory, motivation can be divided into two basic types: intrinsic motivation and extrinsic motivation. Intrinsic motivation refers to the situation of doing something that result in inherently interesting or enjoyable, while extrinsic motivation refers to the situation of doing something that lead to a goal achievement, such as improved problem-solving capabilities and job performance at work. Together, intrinsic and extrinsic motivations influence individual behavioral intentions as well as their actual behaviors (Moon & Kim, 2001).

KM implementation is an administrative innovation designed to build employee knowledge and devise new management practices. Since employees hold firm knowledge, the success or failure of KM implementation depends on employee motivation to acquire, utilize, and share knowledge within the organization (Moffett *et al.*, 2003). Based on the concept of altruism, altruism is motivated by an intrinsic motivation to help others or a desire to do good even without being rewarded (Baumeister, 1982). Altruism may become an employee motivation when employees believe that KM implementation will be worth the effort and moreover will provide opportunities to help others. Previous research has demonstrated that employees are intrinsically motivated to contribute knowledge through online communities of practice because engaging in intellectual pursuits and solving problems is challenging or pleasurable, and because they enjoy helping others (Wasko & Faraj, 2000). Employees who derive enjoyment from helping others thus may contribute significantly to successful KM implementation. The following hypothesis thus is proposed.

**H1:** *Intrinsic motivation relates positively with KM implementation level.*

Extrinsic motivation to participate in KM is an outcome belief that is typically based on employee perceptions of the benefits of KM implementation (Osterloh & Frey, 2000; Kankanhalli *et al.*, 2005a). From a socio-economic perspective, if employee perceived benefits equal or exceed the costs then the specific activity will continue, otherwise it will stop (Kelly & Thibaut, 1978). In the context of KM, extrinsic motivation (operationalized as perceived benefits) indicates employees believe in their ability to obtain effective decision making, job performance, and learning capabilities while implementing successful KM within the organization. Employees who believe they can receive benefits from KM will be more willing to create and share their knowledge with colleagues. Thus, employee extrinsic motivation is expected to be positively associated with the level of KM implementation. The following hypothesis is proposed.

**H2:** *Extrinsic motivation relates positively with KM implementation level.*

#### **Relationship between social interaction and KM implementation level**

Social interaction strengthens reciprocity among employees by encouraging them to share information, experiences, and ideas. Scholars of social networks have suggested that the closeness or connectivity of social interaction between two individuals fosters organizational innovation and diffusion (Sparrowe *et al.*, 2001; Bell, 2005; Brachos *et al.*, 2007). Additionally, Chen & Huang (2007) emphasize the importance of interpersonal social interaction as a channel of knowledge sharing and resource flows which enables KM activities. Administrative innovation activities are characterized by being unpredictable, multi-disciplinary, and involving variability in business process, and firms must exploit multiple viewpoints by developing social interaction among employees (Tsai & Ghoshal, 1998). Through effective social interaction in terms of interpersonal trust, openness in communication, and social reciprocity, firms can enhance the level of KM implementation to establish an innovation environment.

Interpersonal trust has been defined as employees maintaining reciprocal faith in each other in terms of intentions and behaviors (Whitener, 2001). Lee & Choi (2003) examined the lack of trust among employees as one of the key barriers preventing KM activities. When employee relationships have high trust, they become more willing to participate in KM and facilitate organizational KM implementation. Hence, higher interpersonal trust among employees allows firms to integrate knowledge resources and implement KM activities more efficiently. Thus, the following hypothesis is proposed.

**H3:** *Interpersonal trust relates positively with KM implementation level.*



In the context of KM, openness in communication can be defined as the degree to which employees are willing to exchange their ideas and knowledge with colleagues, even if those ideas contradict popular opinion. Studies have shown that openness in communication acts as a major facilitator in establishing a learning culture (Marquardt & Peynolds, 1994). Hoegl *et al.* (2003) suggested that when employees have access to open communication channels and communicate regularly, they can easily acquire, utilize, and share knowledge within the organization. Therefore, it is reasonable to believe that open communication is an important antecedent of KM implementation level. The following hypothesis is proposed.

**H4:** *Openness in communication relates positively with KM implementation level.*

Reciprocity behavior has been highlighted as a benefit of individuals engaging in social exchange (Blau, 1964). Based on social network theory, an exchange relationship can involve socio-emotional resources such as social reciprocity (Ibarra, 1993). Social reciprocity can provide a sense of mutual indebtedness, leading knowledge workers to engage in knowledge exchange, ensuring ongoing supportive KM activities (Kollock, 1999). Wasko & Faraj (2005) indicated that knowledge sharing in online communities is facilitated by a strong sense of reciprocity. Thus, with employees who believe they can obtain social reciprocity from other colleagues by sharing their knowledge, firms are likely to promote and implement KM successfully. The following hypothesis thus is proposed.

**H5:** *Social reciprocity relates positively with KM implementation level.*

#### **Relationship between KM strategy and KM implementation level**

KM strategy refers to the systems and processes by which knowledge, including technology, know-how, expertise, and skills are transferred between two or more actors (individuals or groups). Most KM scholars agree that KM strategy is critical to KM effectiveness and also in leveraging knowledge for greater organizational innovation capability (O'Dell & Grayson, 1999; Goh, 2002; Cavusgil *et al.*, 2003; Rhodes *et al.*, 2008). The challenge in developing KM strategy is determining how explicit and tacit knowledge can be codified and transferred in an organization. Explicit knowledge can be expressed in codified form, and therefore can be transferred through computer systems, internal networks, and database (Nonaka, 1994). In contrast, tacit knowledge is personal, and is best transferred through less structured processes, such as mentoring, teamwork, chat rooms, and face-to-face conversations (Nonaka & Takeuchi, 1995). According to the explicit- and tacit-orientation perspective, KM strategy can be categorized into two approaches: codification knowledge strategy and personalization knowledge strategy (Hansen *et al.*, 1999; Choi & Lee, 2003).

Codification knowledge strategy can be viewed as a technology-driven approach, and emphasizes the technology-based capability to codify, store, retrieve, and reuse explicit firm knowledge (Hansen *et al.*, 1999). Zack (1999) suggests that information technology is a key driver for explicit knowledge transfer because it can be effectively used to facilitate the codification, integration, and dissemination of organizational knowledge. Information technology facilitates the transfer of explicit knowledge within organizations and through the development of virtual knowledge networks; the codification knowledge strategy facilitates knowledge exploitation, resulting in the evolution of KM. Thus, an effective codification knowledge strategy is expected to be positively associated with KM implementation level. The following hypothesis is proposed.

**H6:** *Codification knowledge strategy relates positively with KM implementation level.*

Personalization knowledge strategy can be viewed as a people-to-people approach; it emphasizes tacit knowledge transfer through person-to-person contacts and involves using teamwork to discuss problem solving (Hansen *et al.*, 1999). This human-centric approach focuses on dialogue among individuals and enables the gradual and experiential learning necessary to successful tacit knowledge transfer. Because tacit knowledge is difficult to specify, enhancing organizational learning capability may create opportunities to detect required knowledge. According to the survey of Cavusgil *et al.* (2003), tacit knowledge transfer is important in improving innovation performance. Additionally, the appropriate personalization knowledge strategy is often cited as an essential component of innovation processes in relation to KM (Scarborough, 2003; du Plessis, 2007). Consequently, KM implementation is likely to be accelerated when firms adopt the personalization knowledge strategy for KM. The following hypothesis is proposed.

**H7:** *Personalization knowledge strategy relates positively with KM implementation level.*

## **Method**

### **Survey procedure and sample**

Data were collected through mail survey of senior executives in Taiwanese companies. A draft questionnaire was adapted from previous studies and modified for use in the KM context. With establishing the content validity, the questionnaire was refined through rigorous pre-testing. The pre-testing focused on instrument clarity, question wording, and validity. During the pre-testing, three senior doctoral students, two management profession and three senior executives (in charge of KM implementation in their companies) were invited to comment on the questions and wordings. The comments

of these eight individuals then provided a basis for revisions to the construct measures.

The sample frame was selected based on the 2008 Common Wealth directory of the 1000 largest firms in Taiwan. However, this list excludes information regarding the names of senior executives in charge of KM implementation in their companies. Consequently, to ensure that senior executives received the questionnaire and maximize response rate, four research assistants spent one month telephoning these 1000 firms. The research assistants asked the target firms whether they have planned or implemented KM activities. Additionally, the research assistants sought the name of the senior executives to whom a questionnaire should be mailed. Firms with no plan to implement KM were removed from the sample. This process produced a sample of 850 firms from various industries. The final questionnaires were mailed to the 850 senior executives in the spring of 2009. A cover letter explaining the study objectives and a stamped return envelope were enclosed. Follow-up letters were sent approximately three weeks after the initial mailing.

### Instrument

Intrinsic motivation was measured with four items adapted from Wasko & Faraj (2000). The measure focused on employee perceptions of pleasure obtained through sharing knowledge with colleagues. Extrinsic motivation was assessed using items adapted to reflect employee beliefs in their benefits in terms of meeting knowledge needs, improving job performance and innovation practices, and enhancing learning capabilities while providing successful KM implementation in an organization, following Becerra-Fernandez & Sabherwal (2001) and Kulkarni *et al.* (2006).

Items for measuring interpersonal trust were adapted from Lee & Choi (2003). The scale measures the degree of reciprocal faith in employee intentions, behaviors, and skills regarding KM activities. Openness in communication was measured with items adapted from Roberts & O'Reilly (1997). Higher scores indicate that employees feel free to communicate their ideas and knowledge with colleagues. Items for social reciprocity focus on employee beliefs that current knowledge sharing would lead to future requests for knowledge being met, following Kankanhalli *et al.* (2005b).

Codification knowledge strategy was assessed with items based on Bhatt (2001) and Rhodes *et al.* (2008). The items measured the degree to which explicit knowledge can be transferred through the technology-driven approach such as computer systems, internal network, and database. Personalization knowledge strategy was measured with items adapted from Beckett *et al.* (2000), Dixon (2000) and Hansen *et al.* (2005). The measure focused on the degree to which tacit knowledge can be transferred through the people-to-people approach such as mentoring, teamwork, chat rooms, and face-to-face conversations (Nonaka & Takeuchi, 1995).

The construct of KM implementation level was measured using descriptions of the five KM implementation levels. The KM implementation levels are labeled initiation, pilot implementation, organic implementation, organizational implementation, and institutionalization. Survey respondents were asked to select the KM level that most fit their firm. This measure is similar to those of Teo & Pian (2004) and Lin & Lee (2005). For all the measures, a five-point Likert scale was adopted except in the item for KM implementation level. Survey respondents were asked to indicate the extent to which they disagree or agree with each statement of the constructs. The operationalized items are shown in Appendix A.

### Statistical analysis

The partial least squares (PLS) approach was employed to analyze the research model of this study. The software program used to conduct the PLS analysis was PLS-Graph Version 3.0 (Chin & Frye, 1994). A variance-based PLS approach was chosen over covariance-based methods such as LISREL because PLS does not impose sample size and distribution restrictions (Chin *et al.*, 2003). PLS is a SEM technique that simultaneously assesses the measurement model and the theoretically constructed structural model (Wold, 1982). Although the measurement and structural parameters are estimated together, a PLS model is analyzed and interpreted in two stages. The measurement model was estimated using confirmatory factor analysis to assess reliability and validity of the measures of theoretical constructs, and the structural model was analyzed to examine the associations hypothesized in the present research model.

### Data analysis and results

#### Sample characteristics

Of the 850 questionnaires distributed, 243 completed and usable questionnaires were returned, representing a response rate of 28.6%. All respondents were senior executives, and had worked in the firm for an average of 14.6 years. The respondents themselves had senior representation, with 78% assuming the position of chief information executive, chief operating officer, chief financial officer, vice president, or chief executive officer. A comparative analysis of number of employees and sales turnover was conducted in order to see if responding firms have significantly different characteristics from non-respondents. T-tests showed no significant difference between the two groups of respondents in terms of number of employees ( $t=1.02$ ,  $p=0.197$ ) and sales turnover ( $t=0.84$ ,  $p=0.411$ ) at the 5% significance level, suggesting that non-response bias was not a concern in this study. Table 1 summarizes the sample characteristics, including industry type, number employees, experience in practicing KM, and KM implementation level.

### Assessing the measurement model

To validate the measurement model, two types of validity were assessed: convergent and discriminant. The convergent validity of the scales was verified by using three criteria suggested by Fornell & Larcker (1981): (1) all indicator loadings should be significant and exceed 0.7, (2) construct reliabilities should exceed 0.80, and (3) average variance extracted by each construct should exceed 0.50. As shown in Table 2, all loadings were above the 0.70 threshold, the composite reliability values ranged from 0.84 to 0.94, and average variance extracted

ranged from 0.57 to 0.78. Hence, all the three conditions for convergent validity were met.

To evaluate discriminant validity, the square roots of average variance extracted were compared with the correlations among the latent variables (Fornell & Larcker, 1981). The results in Table 2 confirmed the discriminant validity: the square root of the average variance extracted for each construct was greater than the correlations involving the construct.

A second way to evaluate convergent and discriminant validity was to examine the factor loadings of each indicator; each indicator should load higher on the construct of interest than on any other factors (i.e., loadings should be higher than cross-loadings) (Chin, 1998). As shown in Table 3, the loadings of the constructs were greater than 0.70, and all indicators load more highly on their own construct than on other constructs, hence the test of convergent and discriminant validity was acceptable.

**Table 1** Sample characteristics ( $n=243$ )

Characteristics	Frequency	Percentage
<i>Industry type</i>		
Manufacturing	103	42.4
Computers/communication	40	16.5
Retail/wholesale	34	13.9
Banking/insurance	18	7.4
Health/Foods	15	6.2
Transportation	14	5.8
Real estate/construction	9	3.7
Utility	8	3.3
Others	2	0.8
<i>Number of employees</i>		
Fewer than 1000	68	28.0
1001–5000	108	44.4
5001–10,000	34	14.0
Above 10,000	33	13.6
<i>Experience in practicing KM</i>		
Less than 1 year	53	21.8
1–3 years	105	43.2
3–5 years	35	14.4
Above 5 years	50	20.6
<i>KM implementation level</i>		
Level 1 – Initiation	50	20.6
Level 2 – Pilot implementation	52	21.4
Level 3 – Organic implementation	58	23.9
Level 4 – Organizational implementation	53	21.8
Level 5 – Institutionalization	30	12.3

### Assessing the structural model

The results of structural model analysis are displayed in Figure 2. Employee intrinsic motivation (path coefficient = 0.22,  $p < 0.001$ ) and extrinsic motivation (path coefficient = 0.09,  $p < 0.05$ ) demonstrated a positive relationship with KM implementation level, providing support for Hypotheses 1 and 2. Consistent with Hypotheses 3, 4, and 5, the structural analyses showed that interpersonal trust (path coefficient = 0.09,  $p < 0.05$ ), openness in communication (path coefficient = 0.20,  $p < 0.001$ ), and social reciprocity (path coefficient = 0.15,  $p < 0.05$ ) demonstrated a significant impact on KM implementation level. There was also a significant relationship between personalization knowledge strategy and KM implementation level (path coefficient = 0.19,  $p < 0.01$ ). However, there was insufficient evidence to support Hypothesis 6, as codification knowledge strategy was not significantly related to KM implementation level (path coefficient = 0.07,  $p > 0.05$ ).

**Table 2** Results of convergent and discriminant validity

Construct	Range of loadings	Composite reliability	Average variance extracted	Correlation between constructs								
				IM	EM	IT	CO	SR	CK	PK	KL	
Intrinsic motivation (IM)	0.81–0.89	0.92	0.73	<b>0.85</b>								
Extrinsic motivation (EM)	0.86–0.91	0.94	0.78	0.46	<b>0.88</b>							
Interpersonal trust (IT)	0.77–0.83	0.87	0.63	0.38	0.32	<b>0.79</b>						
Openness in communication (OC)	0.73–0.86	0.88	0.64	0.32	0.40	0.20	<b>0.80</b>					
Social reciprocity (SR)	0.72–0.82	0.85	0.59	0.49	0.41	0.49	0.39	<b>0.77</b>				
Codification knowledge strategy (CK)	0.70–0.85	0.84	0.57	0.38	0.32	0.50	0.37	0.49	<b>0.75</b>			
Personalization knowledge strategy (PK)	0.84–0.88	0.89	0.74	0.42	0.23	0.38	0.24	0.37	0.32	<b>0.86</b>		
KM implementation level (KL)	na	na	na	0.31	0.13	0.22	0.26	0.15	0.23	0.31	<b>na</b>	

Note: na: loading, composite reliability, and average variance extracted are not applicable to the single-item construct. All loadings are significant at 0.001. Diagonal elements (in bold) represent the square root of average variance extracted.

Table 3 Results of factor analysis

Construct	Items	Factor						
		1	2	3	4	5	6	7
Intrinsic motivation	IM1	<b>0.78</b>	0.18	0.13	0.17	0.20	0.03	0.16
	IM2	<b>0.85</b>	0.20	0.13	0.12	0.12	0.08	0.05
	IM3	<b>0.75</b>	0.14	0.14	0.07	0.24	0.08	0.30
	IM4	<b>0.76</b>	0.20	0.08	0.05	0.13	0.24	0.11
Extrinsic motivation	EM1	0.17	<b>0.83</b>	0.12	0.17	0.13	0.10	0.06
	EM2	0.16	<b>0.85</b>	0.14	0.11	0.11	0.12	0.04
	EM3	0.20	<b>0.85</b>	0.09	0.10	0.13	0.11	0.08
	EM4	0.15	<b>0.79</b>	0.05	0.25	0.15	0.02	0.06
Interpersonal trust	IT1	0.11	0.09	<b>0.75</b>	0.04	0.10	0.16	0.13
	IT2	0.07	0.18	<b>0.79</b>	0.18	0.08	0.15	0.14
	IT3	0.07	0.03	<b>0.75</b>	-0.02	0.24	0.14	-0.01
	IT4	0.20	0.11	<b>0.76</b>	-0.03	0.18	0.17	0.20
Openness in communication	OC1	0.01	0.25	0.04	<b>0.71</b>	0.23	0.04	0.06
	OC2	0.01	0.09	0.05	<b>0.80</b>	0.12	0.05	0.11
	OC3	0.11	0.15	0.08	<b>0.81</b>	0.11	0.12	0.04
	OC4	0.22	0.10	-0.02	<b>0.73</b>	0.02	0.15	0.04
Social reciprocity	SR1	0.19	0.13	0.18	0.06	<b>0.71</b>	0.24	0.10
	SR2	0.15	0.19	0.05	0.12	<b>0.77</b>	0.18	-0.02
	SR3	0.19	0.13	0.21	0.21	<b>0.71</b>	0.09	0.16
	SR4	0.13	0.10	0.20	0.13	<b>0.74</b>	-0.01	0.18
Codification knowledge strategy	CK1	0.06	0.10	0.24	0.30	0.30	<b>0.79</b>	0.15
	CK2	0.01	0.15	0.20	0.14	0.27	<b>0.75</b>	0.07
	CK3	0.15	0.03	0.15	0.10	0.14	<b>0.82</b>	0.12
	CK4	0.17	0.16	0.18	0.09	0.01	<b>0.77</b>	0.03
Personalization knowledge strategy	PK1	0.18	0.11	0.05	0.07	0.09	0.09	<b>0.84</b>
	PK2	0.07	0.03	0.11	0.13	0.18	0.07	<b>0.81</b>
	PK3	0.21	0.06	0.27	0.05	0.05	0.09	<b>0.78</b>

Note: Bold values represent the loadings for the items as they fit into the seven constructs.

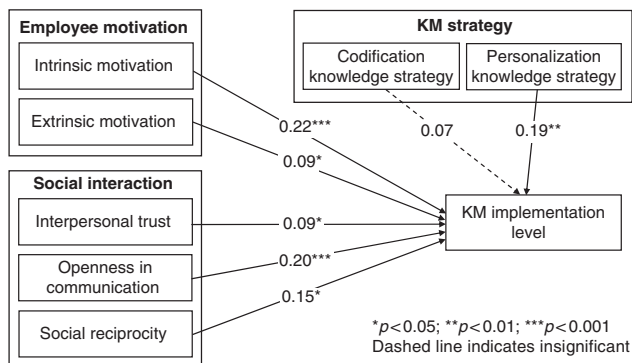


Figure 2 Results of structural model.

Discussion and conclusions

This study builds up a research model that incorporates employee motivation, social interaction, and KM strategy to predict organizational KM implementation level. The

findings provide important implications for KM research and practice.

Implications for KM research

Although previous research has suggested the existence of significant human resource, social and strategic challenges facing the evolution of KM implementation, few studies have empirically examined these effects (McDermott, 1999; Widen-Wulff & Ginman, 2004). This study contributes to the KM literature by empirically examining the influence of employee motivation (intrinsic motivation and extrinsic motivation), social interaction (interpersonal trust, openness in communication, and social reciprocity), and KM strategy (codification knowledge strategy and personalization knowledge strategy) on KM implementation level. Besides the influence of codification knowledge strategy on KM implementation level, the data support the rest of the hypotheses proposed in the research model. The results proved that a



greater level of KM implementation must engage employee minds (to increase employee willingness to participate), relationships (to facilitate interpersonal social interaction among employees), and behaviors (to transfer employee tacit knowledge). The findings of this study fill the gap in the KM literature that is a lack of empirical examination of influences on the extent of KM implementation.

The results clearly demonstrate significant positive associations between employee motivation (intrinsic and extrinsic motivation) and the level of KM implementation. These findings highlight the critical roles of employee motivation in the evolution of KM implementation. Employees who enjoy sharing their knowledge will contribute to increasing KM implementation. Because knowledge is deeply integrated in individual character and identity, employees feel good about contributing knowledge to help others, firms are more likely to achieve increased KM implementation. This finding is consistent with that of Kankanhalli *et al.* (2005b), who argued that altruism is an important motivator for knowledge contribution. The results also provide evidence that extrinsically motivated employees, as measured by perceived benefits, are necessary to successful KM implementation. That is, if employees perceive KM activities as improving their job performance, they are more likely to participate in those activities. Hence, employee perceptions of benefits may lead them to participate and contribute to the KM effort, and influence subsequent KM evolution.

The results also provide evidence that social interaction factors (interpersonal trust, openness in communication, and social reciprocity) play an important role underlying the evolution of KM implementation. These results are consistent with Singh's (2005) conceptualization of social networks as facilitators of successful knowledge diffusion. Owing to the collaborative learning process being integral to KM, the development and growth of social networks enables employees to scale initial hurdles to acceptance and participation, leading to successful KM implementation. By increasing mutual trust and providing broader channels for communication among employees, firms are likely to have high absorptive capacity to utilize organizational knowledge during KM implementation. Crucially, KM implementation is enhanced if firms encourage interpersonal trust and open communication. Moreover, organizational employees have different professions and backgrounds, and their attitudes towards collaboration depend on reciprocal social relations and equitable benefit sharing, and thus information and knowledge sharing do not occur freely without reciprocity. Consequently, the establishment of social interaction networks is necessary to foster cooperative learning among employees, in turn increasing knowledge sharing and application.

This study also shows that personalization knowledge strategy plays a vital role underlying the evolution of KM implementation. Thus, if organizational KM efforts are focused on making personalization (tacit) knowledge

transfer, firms are more likely to achieve increased levels of KM implementation. This finding is in line with previous studies (Cavusgil *et al.*, 2003; du Plessis, 2007), which suggested that capturing tacit knowledge from an individual or group provides a valuable source of administrative innovation because of a lack of knowledge for use as an innovation input. However, perhaps the most surprising finding of this study is the lack of direct impact of codification (explicit) knowledge strategy on KM implementation level. One potential explanation for the different results may be due to the fact that organizations frequently face various tasks and problems, and must generate innovative solutions to those problems (Hansen *et al.*, 1999). Consequently, although access to and reuse of existing knowledge (codification knowledge strategy) may enable companies to leverage knowledge, capturing tacit knowledge is one of the main challenges faced by the current trend of knowledge innovation.

### Implications for practice

This study also makes some practical contributions for managers interested in KM implementation and how to facilitate the continued evolution of firm KM initiative. First, since employee intrinsic motivation (i.e. enjoyment in helping others) significantly influences the extent of KM implementation, managers need to increase employee level of enjoyment from helping one another through knowledge sharing. Managers interested in developing and sustaining KM should focus on increasing altruism among employees, thus increasing KM implementation. Furthermore, employee perceptions of KM benefits can stimulate their participation in KM that may eventually lead to successful KM implementation.

Second, the results indicated that social interaction ties significantly influence level of KM implementation. Organizations willing to promote a high level of KM implementation must develop mechanisms that encourage social interaction and the strength of relationships among knowledge workers. Managers thus should encourage employees to participate in social networks that facilitate social interaction among knowledge workers by enhancing interpersonal trust, informal communication, and reciprocal relationships, in turn increasing the maturity of KM implementation.

Finally, although Argote *et al.* (2000) suggested that both codification (explicit) and personalization (tacit) knowledge transfer are necessary to generate an effective KM strategy, the results of this study indicated that personalization knowledge strategy was more important than codification knowledge strategy. Technology-oriented KM strategy happens in the knowledge acquisition phase, it can improve knowledge transfer efficiency by accelerating transfer and decreasing time and distance costs. Managers should focus on personalization knowledge strategies (encourage the person-to-person sharing of tacit knowledge) to cultivate KM as a core organizational competency when the organizational

goal is to facilitate the evolution of KM implementation. Hence, the increasing importance of the field of tacit knowledge transfer is primarily attributed to promotion of successful KM activities and increased level of KM implementation.

### Limitations and future research

Several limitations of this study should be acknowledged. First, the sampling approach adopted in this study imposed a methodological constraint and limited the external validity. Future research thus should use both structured interviews and case studies of managers dealing with ongoing or recently completed KM projects to enhance understanding of the impacts of employee motivation, social interaction, and KM strategy factors on KM implementation level. Second, although the scales used for measuring employee motivation, social interaction, and KM strategy factors have similarities with existing scales, further research might consider developing more elaborate measures to allow for a richer coverage of these antecedents of KM implementation

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## Appendix A

### Questionnaire items

#### Intrinsic motivation

- IM1 Employees enjoy sharing their knowledge with colleagues
- IM2 Employees enjoy helping colleagues by sharing their knowledge
- IM3 Employees feel good to help someone by sharing their knowledge
- IM4 Employees think that sharing their knowledge with colleagues is pleasurable

#### Extrinsic motivation

- EM1 Employees believe that organizational KM implementation can meet their knowledge needs
- EM2 Employees believe that organizational KM implementation can improve their job performance
- EM3 Employees believe that organizational KM implementation can improve their innovation practices
- EM4 Employees believe that organizational KM implementation can enhance their learning capabilities

#### Interpersonal trust

- IT1 Employees are generally trustworthy
- IT2 Employees have reciprocal faith in the intentions and behaviors of colleagues
- IT3 Employees have reciprocal faith in others' ability to participate in KM
- IT4 Employees have reciprocal faith in others' behaviors to participate in KM

#### Openness in communication

- OC1 In my organization, discussions of difference of opinion are encouraged among employees
- OC2 There is a sufficient level of mutual understanding among employees in job-related discussion

- OC3 Openness communication among employees is helpful for job-related tasks
- OC4 The manner of communication among employees is frank and candid

#### Social reciprocity

- When employees share their knowledge with colleagues,
- SR1 they strengthen ties between existing colleagues and themselves
- SR2 they expand the scope of their association with other colleagues
- SR3 they expect to receive knowledge in return when necessary
- SR4 they believe that their future requests for knowledge will be answered

#### Codification knowledge strategy

- CK1 Employees use the computer systems to save and renew important information for easy access
- CK2 Employees saves important information through words, tables, and figures in the computer systems
- CK3 Employees uses internal network to share knowledge with colleagues
- CK4 Knowledge is categorized in the database for use by all employees

#### Personalization knowledge strategy

- PK1 In my organization, high levels of participation are expected in sharing their information, experiences, and ideas
- PK2 My organization transfers effective knowledge to employees through teamwork, chat rooms, and face-to-face conversations
- PK3 My organization transfers effective knowledge to employees through training courses, presentations, and internal magazines

#### KM implementation level

What is the level that most closely fit your organization for implementing the KM activities?

- *Initiation* – My organization recognizes the importance of KM, but only focuses on the KM planning phase.
- *Pilot implementation* – My organization has conducted a pilot implementation of KM activities to a single function (i.e., production, marketing, R&D), or to a single division, instead of targeting all functions of the organization.
- *Organic implementation* – My organization proactively encourages employees to share expertise and participate in group problem-solving for continued implementation and expansion of KM activities such as acquiring or creating, storing, sharing, utilizing, and protecting knowledge.



- *Organizational implementation* – My organization has implemented KM in the whole organization since KM is a company-wide strategy for managing organizational culture for learning, knowledge sharing, and error avoidance.
- *Institutionalization*: In my organization, KM can effectively adapt to change and enhances organizational performance. The application of knowledge for work-related problems becomes a regular day-to-day activity of the organization.

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