AN INTEGRATED FRAMEWORK FOR RESEARCH IN ORGANIZATIONAL KNOWLEDGE MANAGEMENT

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Keywords: Organizational knowledge management, Knowledge management technology, Knowledge management systems, knowledge management review, Research Issues in Knowledge Management

Abstract: Knowledge is an important key asset to many organizations. Organizations which can manage knowledge effectively are expected to gain competitive advantage. Information technologies have been widely employed to facilitate Knowledge Management (KM). This paper reviews and synthesise the main prior conceptual and empirical literature, resulting in a comprehensive framework for research in IT-enabled KM at the organizational level. The framework aids the generation of potential hypotheses for future research and the understanding and classification of existing KM related research.

1 INTRODUCTION

Globalization and advanced technological development help organizations expand markets and diversify risk. However, they also render markets more volatile and competitive. Knowledge which can help organizations become more creative and provide better quality and efficient services to customers becomes the key to success. As telecommunication infrastructure and information systems become more capable, organizations and researchers are also concerned with how IT or IS can facilitate KM and how to justify the corresponding investments. As there are different interpretations of knowledge and a variety of KM technologies/systems, people who want to conduct KM empirical studies at the organizational level should carefully and clearly define all knowledge related terms in order to facilitate generalization and comparison of studies. In order to facilitate future research on organizational KM, a thorough and congruent understanding of basic concepts and limitations in existing KM research is required and a comprehensive research framework is needed.

The paper will start with a literature review of the basic concepts relating to knowledge, KM and KM technologies/systems, drawn from the current body of relevant literature. Then, a comprehensive framework for research in IT-enabled KM at the organizational level will be constructed through a synthesis of prior research frameworks. Subsequently, existing empirical quantitative KM research will be reviewed. Conclusions will then be drawn.

2 BASIC CONCEPTS

2.1 Knowledge

Knowledge is different from information and data. It resides in individuals and is created only when individuals have processed or responded to a collection of information (Alavi et al. 2001; Malhotra 2001). There are different classifications of knowledge, e.g. tacit-explicit, individual-collective (Nonaka 1994; Alavi et al. 2001) and product-expertise (Constant et al. 1994). Besides, knowledge is different from tangible assets which are provided and easily declared ownership by organizations. The difference in perceptions between self-ownership and collective ownership of knowledge will affect effectiveness of KM (Jarvenpaa et al. 2001). As of the word “knowledge” is susceptible to multiple interpretations, it is often interpreted differently by people with different background. Therefore, researchers who want to conduct KM studies should carefully define the term ‘knowledge’ in order to protect internal validity and facilitate comparison among studies.

S. S. Fu S. and K. O. Lee M. (2005).
AN INTEGRATED FRAMEWORK FOR RESEARCH IN ORGANIZATIONAL KNOWLEDGE MANAGEMENT.
In *Proceedings of the Seventh International Conference on Enterprise Information Systems*, pages 151-156
DOI: 10.5220/0002554801510156

2.2 Knowledge Management

KM is process-oriented and context-specific. Business process is not defined by functional areas. It is a set of closely related activities carried out to achieve a business goal. KM should be designed in such a way that useful knowledge can be created, captured, transferred and applied in each activity along the entire business process if necessary.

KM is consisted of four main processes: (1) creation, (2) storage/retrieval, (3) transfer, and (4) application (Alavi et al. 2001). Although the concept of KM as a process is commonly adopted by different researchers, different KM processes have been identified (e.g. (Holsapple et al. 1999; Gold et al. 2001)). Organizational members within different culture may also have different perceptions towards KM. Besides, the KM context of organizations (e.g. knowledge requirements, KM processes and KM strategies, etc.) may be different according to their competitive bases (product-based or service-based) and the volatility of business environment (Kankanhalli et al. 2003). Therefore, researchers should carefully define KM and identify appropriate samples in order to minimize errors and provide reliable results.

2.3 KM Technologies or Systems

KM has become a socio-technical issue (Alavi et al. 2001; Lee et al. 2003). Information technologies and systems that are used to facilitate KM processes are called KM technologies or systems (KMS). As the requirements of KM become higher, KMS has become a very important factor in KM (Alavi et al. 2001; Lee et al. 2003).

Taking the advantages of rapid technological development, a wide variety of KMS is available. However, different KMS may differ substantially in complexity and functionality (e.g. e-mail and Customer Relationship Management Systems). Therefore, researchers should be careful in selecting KMS for their research in order to meet their research objectives and provide reliable and valid results.

3 A COMPREHENSIVE FRAMEWORK FOR STUDYING IT-ENABLED KM AT THE ORGANIZATIONAL LEVEL

Prior empirical studies which have gone beyond qualitative case studies provide important pointers to the type of variables used in conceptualizing KM theories for studying IT-enabled KM at the organizational level. However, prior studies of this sort tend to be disjoint and relatively few in number. Although there are some existing models, they all have some limitations. It is therefore necessary to develop a comprehensive framework in order to provide an integrative view of potential KM research for guiding the future empirical study and classify existing empirical studies to obtain a more holistic understanding of current empirical work in the KM field.

Three models of previous empirical KM research were used, integrated and modified. Among them, Lee and Choi's integrative KM research framework (Lee et al. 2003) was found to be the most comprehensive. It proposed that KM enablers exist within an organizational environment (e.g. culture, structure, people and information technology) would affect KM processes which would then enhance organizational performance through KM intermediate outcome. However, KMS exist within both an organizational environment and an external environment (Ives et al. September, 1980). In Moffett, McAdam, Parkison's MeCTIP model (Moffett et al. 2003), it has proposed that macro-environmental factors would influence KM indirectly through elements of organizational environment. Besides, direct outcome of effective IT-enabled KM process does not necessarily lead to effective organizational performance. It is because benefits of IT are unique to a particular organization; and thus appropriate organizational changes should be formed to complement IT investment and achieve the greatest effectiveness (Brynjolfsson et al. 1998). In Khalifa's model (Khalifa et al. 2001), it proposed that the effect of intermediate outcome on performance was mediated or moderated by appropriation. Our integrated framework with suggested propositions was shown in figure 1.

3.1 Research Type I - Impact of KM Enablers on KM Processes

This type of research can focus on the identification of important KM enablers and the relationships between variables of KM enablers and KM processes. KM is a socio-technical issue. Factors within an organizational context can be classified into (1) organizational climate (e.g. culture, structure, strategy (Khalifa et al. 2001; Lee et al. 2003)), (2) technological climate (e.g. IT support (Lee et al. 2003), system standardization and compatibility and technical usability (Moffett et al. 2003)) and (3) human factors (e.g. employee emancipation and learning capacity (Becerra-Fernandez et al. 2001))

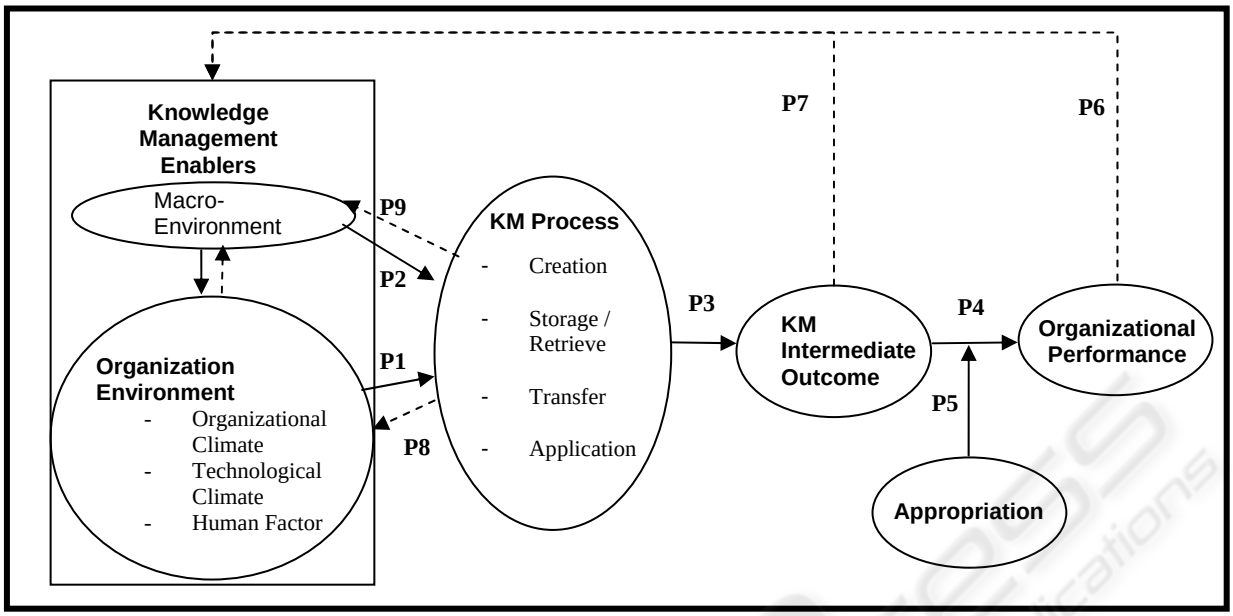

Figure 1: An Integrated Framework for Studying Multifaceted Relationships in KM at the Organizational Level

within an organizational environment. Significant effect of those KM enablers on KM processes has been found in previous studies. Therefore, a corollary to Proposition 1 would be:

P1: Organization-environmental factors have significant effects on KM processes.

KM enablers are those factors which can facilitate and enhance KM processes. They can be categorized into two types: external and internal. External factors refers to those existed in macro-environment (Moffett et al. 2003). They will affect KM indirectly through an organizational context (Moffett et al. 2003). External variables such as partnership or alliance were found to be significantly related to the use of IT in KM (Gottschalk et al. 2002). As a corollary, Proposition 2 would be:

P2: The association between macro-environmental factors and KM process is mediated by mediated / moderated by organization-environmental factors.

3.2 Research Type II - Impact of KM Processes on KM Intermediate Outcome

This type of research can focus on studying the direct benefits or costs (i.e. KM intermediate outcome (Lee et al. 2003)) derived from changes in KM processes after adopting or implementing new KMS. Although KMS may facilitate KM processes, IT-enabled KM is not a sufficient condition for ultimate business success (Janz et al. 1997; Khalifa et al. 2001; Lee et al. 2003). Even though performance improvement is observed, it may be due to other factors such as more capital investment, change in management and establishment of reward schemes. Moreover, organizational performance including tangible and intangible benefits and costs (e.g. customers' satisfaction and service quality) is difficult to measure and there is a lack of reliable measurement. Therefore, in order to have a more effective assessment of the impacts derived directly from the use of KM, intermediate outcomes (Lee et al. 2003) are needed to be measured. It was found that organizational creativity would significantly be affected by the knowledge creation process (Becerra-Fernandez et al. 2001; Lee et al. 2003). As a corollary, Proposition 3 would be:

P3: KM processes have significant effects on KM intermediate outcomes.

3.3 Research Type III - Impact of KM Intermediate Outcomes on Organizational Performance

This type of study can focus on the development of measurements for appropriation and organizational performance; and the study of how KM intermediate outcomes can result in improved organizational performance. Intermediate outcome does not necessarily lead to performance. Appropriate organizational changes (Brynjolfsson et al. 1998) and use of KM technologies (Triplett 1999) that are suited to an organizational context are necessary for

improvement in organizational performance. Existence of adequate KM processes may contribute direct benefits. However, it does not necessarily lead to KM effectiveness as measured by performance impacts unless KM structures are used properly (Khalifa et al. 2001). As a corollary, Proposition 4 and 5 would be:

P4: KM intermediate outcomes have significant effects on organizational performance.

P5: The association between KM intermediate outcome and organizational performance is mediated / moderated by appropriation.

3.4 Research Type IV - Reverse Impacts of KM on an Organization

Most previous research in KM usually study relationships in one direction only, e.g. the causal effect of KM enablers on KM processes and the effect of KM processes on KM intermediate outcomes or organizational performance. However, as many organizations have already adopted some kinds of KMS to facilitate KM, it is time to study how those components are related in another/reverse directions.

When the impacts of KM (i.e. intermediate outcome or performance) are recognized, macro-environmental factors and organizational context will be changed. If positive and satisfactory impacts are resulted, e.g. improved communication and decision making, more resources will be invested in establishing and enhancing KM and employees will be more willing to engage in KM processes. When negative or dissatisfactory outcomes are resulted, e.g. threat of privacy, power relations and inequities (Schultze et al. 2002), more resources have to be invested to find solutions and employees' trust and motivation will be deteriorated. Macro-environmental factors will also be affected directly or indirectly, e.g. market environment, inter-organizational relationships, external pressures (Teo et al. 2003), technological standards, law and regulations, etc. Therefore, as a corollary, Proposition 6 and Proposition 7 would be:

P6: Changes in organizational performance have significant effect on KM enablers.

P7: KM intermediate outcomes have significant effect on KM enablers.

Feedback from changes in KM processes affect organizational context. After the KM processes are affected, the culture of the organization, employees' attitudes towards KM, employees' knowledge and requirements for organizational technological level may be changed. Besides, more issues relating to IT-enabled KM processes may be experienced, e.g. problems of IS security and privacy. Organizational members are inevitably affected and new KMS may have to be adopted to maintain or improve the KM process. As a corollary, Proposition 8 would be:

P8: Changes in KM processes have significant impact on organizational factors.

The changes in organization context will probably affect macro-environment (e.g. government policies and technological development). For example, more and more people are focusing on the effect of privacy on KM and privacy regulations have been established (Wheelwright 1999). Steps have also been done to protect users' privacy and alley their concerns by securing privacy through careful design and implementation of KMS such as allowing notice and choice of sharing knowledge, highly targeted message, enabling novel kinds of ad hoc conversation and anonymous messaging (Adar et al. 2003; Schirmer 2003). As a corollary, Proposition 9 would be:

P9: The association between KM process and macro-environmental factors is mediated / moderated by organization-environmental factors.

4 EMPIRICAL RESEARCH REVIEW

KM and KMS-related journals published between 1998 and 2003 were found. There were totally 293 articles. Only ten of them have been studied within an IS context and covered empirical quantitative studies. Table 1 summarizes the studies.

Most of the studies found were concentrated on the north-east diagonal of the matrix. Type I, II and III KM research have been studied. The hypotheses studied were unidirectional. They focused mainly on the impact of organization-environment KM enablers or KM process. Besides, most of them were interested in studying changes in organizational performance. However, research on macro-environment KM enabler is few. On the main diagonal matrix, it shows that some previous research has studied the relationships among organization-environment enablers. There are no studies stated on the south-west diagonal of the matrix. Type IV KM research is currently poorly covered and needs more attention.

Beside the problem of limited empirical quantitative studies relating to IT-enabled KM, there are some limitations of existing research. Among those existing empirical quantitative studies, there is a lack of replication of work and standard

Table 1: Empirical Quantitative KM Research

DV / IV	Macro-environment KM Enabler	Organization-environment KM Enabler	KM Process	KM Intermediate Outcome	Organizational Performance
Macro-environment KM Enabler		(Gottschalk et al. 2002)			(Lee 2000)
Organization-environment KM Enabler		(Jarvenpaa et al. 2001; Ryan et al. 2001)	(Becerra-Fernandez et al. 2001; Lee et al. 2003; Politis 2003)	(Lee et al. 2003)	(Lee 2000; Gold et al. 2001; Lee et al. 2003)
KM Process				(Janz et al. 1997; Becerra-Fernandez et al. 2001)	(Lee 2000; Gold et al. 2001; Karlsen et al. 2003; Politis 2003)
KM Intermediate Outcome					
Organizational Performance					
IV – Independent Variable DV – Dependent Variable					

measurements. Most of these studies seem to be ad hoc without much reference to each other. Different researchers have different focuses and use different items or variables to operationalize constructs. For example, "Strategic Grid" (Ryan et al. 2001), collaboration (Lee et al. 2003), trust, learning, organizational intent and higher care (Zarraga et al. 2003) have been used in different studies to study organizational context. These reduce the precision, generalizability and authenticity of the theories developed. Besides, important KM issues (King et al. 2002) recognized by KM practitioners and corporate executives do not receive enough attentions in academic research, e.g. how to use KM to provide strategic advantage, how to motivate individuals to contribute their knowledge to a KM system, how to ensure knowledge security and how to assess the financial gain and loss. Further research will be needed to contribute useful solutions to the business world.

5 CONCLUSIONS

This study gives an overview of existing research in KM including both qualitative and quantitative studies; and provides a basic idea of what KM at the organizational level is. This is especially useful for new entrants to study KM while current participants can have an overview and be aware of some existing problems in KM research. KM is a very broad area of study.

There are a lot of qualitative studies and well-known theories. However, there is a lack of empirical quantitative studies, replication of research, comprehensive research models and standard measurements. This deficiency hinders the ongoing validation of existing theories and reduces the generalizability, realism and precision of existing theories. Therefore, more empirical quantitative studies will be needed. In order to facilitate future empirical study in IT-enabled KM at the organizational level, an integrated framework with multi-faceted relationships was developed. Potential research and propositions for future study were also presented. Examples of variables were also given to facilitate the generation of hypothesis. The framework can help provide guidance, make comparison of prior studies easier and facilitate the generation of cumulative knowledge.

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