

# Outsourcing Knowledge-based Systems: The Knowledge Sharing Perspective

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## Abstract

*Information systems ranging from transaction processing systems to knowledge-based systems (KBS) have been outsourced. However, few previous studies have captured the differences in the outsourcing of different types of systems. Considering the nature of KBS, we propose a research model to identify the success factors of KBS outsourcing from the knowledge sharing perspective. The model is built on both prior Information Systems (IS) outsourcing success models and a knowledge sharing framework. Results from a survey of 60 organizations show that the knowledge sharing perspective is essential in interpreting the outsourcing success of KBS as well as other knowledge-intensive information systems.*

## Keywords:

Outsourcing success, Knowledge-based System (KBS), Knowledge sharing, Inter-organizational relationship

## Introduction

Information Systems (IS) outsourcing has been a favored option among companies for two dominant reasons: financial savings (Williamson, 1979) and strategic advantages (DiRomualdo and Gurbaxani, 1998). Recently, the resource-based view of the firm (Peteraf MA, 1993) and its outgrowth – the knowledge-based view (Kogut and Zander, 1996; Grant, 1996; Liebeskind, 1996.) – have become instructive reference theories for IS outsourcing researchers (Teng, Cheon, and Grover, 1995). Such strategic management thoughts direct the earlier attention on a firm's external market position back to the internal configuration of firm-specific resources and/or assets. Accordingly, the interest in "organizational knowledge" in IS outsourcing research is revitalized.

Recognition of the significance of organizational knowledge has led to many knowledge management initiatives in

practice which aim to achieve knowledge creation, retention, dissemination and re-use. Such initiatives often require the support of state-of-the-art information technology. A good example is knowledge-based systems (KBS), which are used in device fault diagnosis, assessment and advisory, planning and scheduling, process monitoring and control, product design and manufacturing (Feigenbaum *et al.*, 1993; Land L, 1995), and customized enterprise resource planning (ERP) and customer relationship management (CRM).

KBS emerged on the computing scene in the 1970s, and were commercialized in the 1980s as a form of expert systems (ES) defined as: "AI programs that achieve expert-level competence in solving problems in task areas by bringing to bear a body of knowledge about specific tasks" (Feigenbaum *et al.*, 1993). However, the concept of KBS these days is broader than that of ES because it includes more organizational knowledge such as best practices, knowledge of consumers' behaviors from statistical analysis in CRM, etc.; ES focuses only on extracting individual experts' knowledge and making it available to other members in the organization.

KBS embody specialized knowledge from two different sources: business domain expertise (e.g., credit analysis or fault diagnosis expertise) and knowledge engineering expertise (modeling/statistical techniques, AI theories). Knowledge engineering expertise is often not resident in companies for reasons including cost. For most companies, KBS outsourcing becomes the practical option in obtaining outside knowledge engineering expertise. However, as KBS also involve business domain expertise, which is specific to a company, it is not easy for companies to outsource KBS implementation. Given the complicated nature of KBS outsourcing, it is critical to know and understand the factors determining successful KBS outsourcing. However, little research has been done in the area; despite the central role of knowledge in KBS, few studies on KBS implementation have taken the perspective of knowledge management. Similarly, although KBS with their knowledge intensiveness

are obviously different for traditional transaction-orientated systems, few previous studies have empirically addressed outsourcing practice pertaining to KBS.

To help bridge the research gap, this paper aims to identify key success factors in outsourcing KBS from a knowledge sharing perspective. To achieve this objective, we model KBS outsourcing by applying a knowledge sharing framework (Argote L *et al.*, 2003) on a traditional outsourcing success model. We further attempt to go beyond previous IT outsourcing success studies in success measurement by including the latest development in IS success research (DeLone and McLean, 2003) in our study. We summarize our research questions as follows:

- What are the factors contributing to KBS outsourcing success?
- How can the knowledge sharing framework help explain the success of KBS outsourcing?
- How can the IS success model be applied to measuring KBS outsourcing success?

The rest of the paper is organized as follows. The next section reviews related literature on IT outsourcing and KBS. The third section introduces the knowledge sharing framework and relates it to the KBS outsourcing context. We propose our research model, define our constructs, and set forth our hypotheses in the fourth section. The fifth section discusses construct measurements and the data collection process. We discuss the results of our data analysis next, along with implications for practitioners and academics. Finally, we discuss the limitations of our findings and conclude the paper.

## Literature review

### Outsourcing

IT outsourcing is not a new concept; facility management from the 1960s and contract programming from the 1970s were early forms of IT outsourcing (Lee and Huynh, 2002). However, it was the mega deal between Kodak, IBM, EDS and Businessland in 1989 that legitimized the IT outsourcing practice and attracted the attention of many managers who had long perceived their IT departments as cost centers. Ever since then, a rich IT outsourcing literature has emerged (Lee and Huynh, 2002). Grover, et al. (Grover, Cheon, and Teng, 1996) defined IT outsourcing as “the practice of turning over part or all of an organization’s IS functions to external service provider(s).” One of the major incentives to outsource IT functions is, of course, cost savings. Based on the Transaction Cost Theory (TCT), organizations outsource to avoid paying production cost where it is higher than market transaction cost, which is determined by factors such as asset specificity, uncertainty and transaction frequency (Williamson, 1979).

Nevertheless, IT vendors are not the only ones enjoying

economies of scale. Many huge corporations such as Eastman Kodak Co. (Pearlson, Ibarra, and Applegate, 1994) and General Dynamics (Seger KN, 1994), which are big enough to retain competent internal IT departments, are also contracting out IT activities. Such moves are believed to be based on three strategic concerns: IS improvement, business impact, and commercial exploitation (DiRomualdo and Gurbaxani, 1998).

IS scholars have found the theoretical explanation for strategic outsourcing behavior in the resource-based view. In this perspective, a firm’s various resources, which are characterized by heterogeneity and immobility, form its strategic advantage. Teng et al.’s (1995) article extended this strategic perspective into the IT outsourcing field by regarding IT, IS and information itself as types of organizational resources. They suggested outsourcing as a strategy to make good where performance of internal resource and capabilities fall short of expectation.

Building on these various previous cases and studies, the question nowadays is how to succeed in implementing a specific system through outsourcing rather than a company’s decision to outsource. For an answer, we turn to the existing research on inter-organizational relationships in outsourcing.

### *Inter-organizational relationships (IORs) in outsourcing*

Knowing how to manage and maintain a healthy post-contractual outsourcing relationship is essential because contract provisions do not ensure automatic success. This is where the social exchange, power-political perspectives, and other streams of theories find their application (Lee and Kim, 1999). Although the basis for building a unified understanding of outsourcing relationships has yet to be rigorously defined (Hancox and Hackney, 2000), some relevant studies on the topic exists. However, these early studies overlook the differences among IS (e.g., large volume transaction processing IS vs. high-end intelligent IS). As selective IT outsourcing gains in popularity (Grover, Cheon, and Teng, 1996; Lacity and Willcocks, 1998) and outsourcing of new types of IS (e.g., knowledge management systems) emerges with the revitalized interest in “knowledge” among organizations (Lee JN, 2001), there is clearly need for research in finer granularity (Rao, Nam, and Chaudhury, 1996). The questions of why, how and under what circumstances knowledge can be integrated into the IT outsourcing context also need further consideration.

### *Knowledge-based systems*

KBS can be viewed as a kind of knowledge management systems (KMS) because they both deal with knowledge. KMS are basically IT-based systems developed to support and enhance organizational processes of knowledge creation, storage/retrieval, transfer and application (Alavi M and Leidner D. E, 2001). To manage knowledge by using KBS is probably the approach with the longest tradition if we regard KBS as similar to ES (Earl M, 2001). The fundamental technology of ES emerged in the 1960s as a product of

artificial intelligence research (Martinsons and Schindler, 1995). Early classification divided expert systems into rule-based systems (to replace experts) and normative expert systems (to model a certain expert domain and consequently support an expert) (Jensen FV, 1996). The definition of KBS in this research is closer to the second category although it includes both. Potential benefits brought about by KBS include: making domain expertise available to a larger user base, retaining volatile knowledge, serving as a useful training tool that exposes employees to real-life situations (Land L, 1995).

A working knowledge-based system brings together at least three bodies of knowledge: user's domain knowledge captured in the knowledge base, problem solving wisdom (mathematical, statistical and logic reasoning knowledge) in the inference engine, and application development techniques that weave knowledge from all sources together. Such knowledge-intensiveness differentiates KBS from data processing information systems (e.g., a bank's ATM or a manufacturer's order processing system). Because KBS are often wired with a firm's core business and proprietary expertise, KBS outsourcing is neither a domestic knowledge management project nor a structured and standardized pay-for-service IT outsourcing deal such as a contract for system operations and telecommunications management and maintenance (Grover, Cheon, and Teng, 1996).

Yet many prior KBS studies have focused only on knowledge engineering and technical issues (e.g., Mao and Benbasat, 2000); very few have touched on the socio-economic environment of KBS deployment. These limitations confine the findings in the literature to top management support and the selection of appropriate KBS implementation strategies or 'roads' (Martinsons and Schindler, 1995) based on correct assessment of organizational knowledge structure, organizational culture and people (Dutta S, 1997). Studies on the factors affecting successful KBS outsourcing implementation are clearly not enough. Indeed, the spirited discussion on organizational knowledge (e.g., Lee and Kim, 1999) prompts us to believe that the knowledge-based view (e.g. 12; Kogut and Zander, 1996) stands to offer rich insights into KBS outsourcing.

## Development of research model

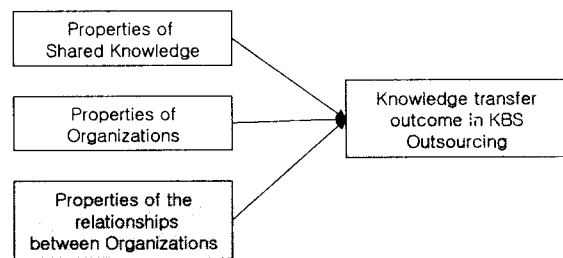
### KBS outsourcing and organizational knowledge sharing

Grant (Grant RM, 1996) viewed knowledge as "the most strategically important of the firm's resources", and saw organizational capability as "the outcome of knowledge integration". Built on the resource-based theory, this perspective persuades us to narrow our focus on the single most important firm-specific resource: knowledge. If a particular body of knowledge is missing within an organization, outsourcing could be an effective channel to obtain the knowledge from external sources.

Therefore, the knowledge intensiveness of KBS inspires us to model KBS outsourcing from the knowledge management

perspective, more specifically the knowledge transfer perspective, where organizational learning is considered to be occurring between a client and a consulting firm. In the integrative framework of organizational learning and knowledge management by Argote (Argote L *et al.*, 2003) in 1999, knowledge transfer is defined in terms of "experience acquired in one unit affecting another". Three dimensions are believed to predict successful transfer: properties of knowledge, properties of participating organizations, and properties of relationships between organizations (shown in Figure 1).

**Figure 1 Conceptual framework**  
(adapted from Argote, 1999; Argote et al., 2003)



**Properties of shared knowledge** Knowledge properties are believed to affect knowledge transfer rate (Argote L, 1999; Argote, McEvily, and Reagans, 2003). For instance, Nonaka (Lee and Kim, 1999) considered inarticulated knowledge – tacit knowledge – to be harder to learn compared to explicit knowledge. Knowledge acquisition in KBS usually deals with declarative knowledge (what), procedural knowledge (how), and causal knowledge (why), which can be made explicit (Zack, 1999). Thus, the problem in KBS development has been how to codify expertise as much and as accurate as possible. Hence, the codifiability of knowledge (Kogut and Zander, 1996) is also our major concern in this research.

**Properties of organizations** Absorptive capacity is the most eminent factor in this category because it determines the effectiveness of knowledge sharing. It refers to "the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends". Such abilities are path-dependent, and are "largely a function of the firm's level of prior related knowledge" (Cohen and Levinthal, 1990). Zahra and George (2002) refined the concept of absorptive capacity with clear distinction between four dimensions or capabilities: acquisition, assimilation, transformation and exploitation.

**Properties of relationship between organizations** Several organizational characteristics account for knowledge transfer success: superordinate relationship (license agreement, etc.), geographical proximity, similarity (Song, Almeida, and Wu, 2003), and quality of relationship (Lee and Kim, 1999).

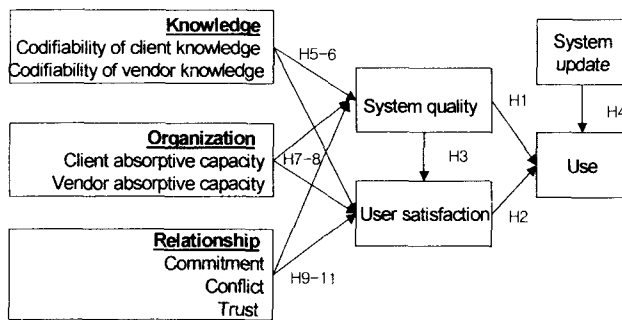
Unfortunately, the relationship dimension has been less tested in existing knowledge transfer/sharing studies. However, it converges to the inter-organizational relationships (IOR) concept in the IT outsourcing success

literature (e.g. Kern and Willcocks, 2000). Evidences exist that IOR directly lead to IT outsourcing success (Lee and Kim, 1999; 20). Therefore, we adopt relevant constructs from previous IT outsourcing success studies in our research.

## Research model

In order to overcome the limitations in outsourcing research on KBS, we propose the research model shown in Figure 2. With the model, we carry out empirical tests based on our previous discussion on knowledge management and sharing.

Figure 2 Research model



## KBS outsourcing success

Among outsourcing success measurements, cost savings have been used as the major indicator of success (e.g., Lacity and Willcocks, 1998); however, this might no longer be appropriate because technological and strategic considerations are also primary reasons for outsourcing (Saunders, Gebelt, and Hu, 1997). This is especially so in the KBS outsourcing context since taking advantage of external KBS implementation expertise is the primary consideration, and success measurements should reflect it accordingly. Lee and Kim (1999) derived better measurements for outsourcing success from the business perspective and user perspective. However, none of the measurements caters to any specific category of information systems. For example, a critical feature of KBS is the currency of the knowledge base and inference engine. According to one of the authors' industry experience, many KBS are abandoned within six months of launch because proper maintenance and updating have been overlooked. Thus, we seek to improve outsourcing success measurement in this research by incorporating the latest developments in IS success research (DeLone and McLean, 2003).

DeLone and McLean's (1992) IS success model provides a comprehensive framework to capture the different aspects of success. Six dimensions are included in the framework: system quality, information quality, use, user satisfaction, service quality and net benefits. However, since net benefits can be affected by many other external factors outside DeLone and McLean's model, we exclude it from our study. Among the remaining five, user satisfaction includes five sub dimensions: accuracy, reliability, timeliness, relevancy and confidence in the system (Bailey and Pearson, 1983) and

the first three are actually very similar to the dimension of information quality. Thus, we adopt only four dimensions of DeLone and McLean's model excluding net benefits and information quality in this study as dependent variables along with system update, which accounts for the service quality dimension as well as the unique feature of KBS as we discussed earlier. We formalize our hypotheses as follows:

*Hypothesis 1: System quality will have a positive effect on use.*

*Hypothesis 2: User satisfaction will have a positive effect on use.*

*Hypothesis 3: System quality will have a positive effect on user satisfaction.*

*Hypothesis 4: System update will have a positive effect on use.*

## Properties of shared knowledge

As reviewed in the earlier section, codifiability of knowledge is considered the most relevant property of knowledge in KBS development. Zander and Kogut (1995) found that "the more codifiable and teachable a capability, the higher the risk of rapid transfer". In KBS projects, detailed and comprehensive documentation, together with clear articulation, explanation and record of the target task procedures, is important for the knowledge engineer to extract knowledge to feed into the system. In the same manner, the knowledge of the service provider (consultant) needs to be documented and articulated so as to guide system development and subsequent maintenance work. Therefore, we hypothesize:

*Hypothesis 5a: Client knowledge codifiability will have a positive effect on system quality.*

*Hypothesis 5b: Client knowledge codifiability will have a positive effect on user satisfaction.*

*Hypothesis 6a: Vendor knowledge codifiability will have a positive effect on system quality.*

*Hypothesis 6a: Vendor knowledge codifiability will have a positive effect on user satisfaction.*

## Properties of organizations

Absorptive capacity has frequently been mentioned as an influence on knowledge transfer (Argote L, 1999; Szulanski G, 1996). From the client's point of view, higher absorptive capacity means that the client is able to quickly understand: what kinds of reasoning methods are used in KBS, how explanation for decisions is constructed and presented, and how the system is integrated with the rest of the IS infrastructure, and so on. This capacity enables the client to suggest better solutions for their particular needs. Such effective user participation has been proven to be beneficial

in system development (Barki and Hartwick, 1994). From the vendor's point of view, the ability to quickly grasp the target task process, information needs and industry best practices definitely helps the vendor in developing a knowledge-based system that best suits the specific requirements of the client organization in a shorter period of time. We hypothesize:

*Hypothesis 7a: Client absorptive capacity will have a positive effect on system quality.*

*Hypothesis 7b: Client absorptive capacity will have a positive effect on user satisfaction.*

*Hypothesis 8a: Vendor absorptive capacity will have a positive effect on system quality.*

*Hypothesis 8b: Vendor absorptive capacity will have a positive effect on user satisfaction.*

### Properties of inter-organizational relationship

Altogether, 19 concepts can be found in three articles (Lee and Kim, 1999; Grover, Cheon, and Teng, 1996; Kern and Willcocks, 2000) that dealt particularly with outsourcing relationship: business understanding, benefit/risk sharing, commitment, conflict, trust, age of relationship, communication, coordination, cultural similarity, dependency, information sharing, joint action, participation, top management support, cooperation, expectations, power, satisfaction, service enforcement, and monitoring. According to Lee and Kim (1999), however, "partnership has its own factors to represent its quality, and several variables influence the degree of partnership quality, and the degree of partnership quality is related to outsourcing success". They verified this rationale in their study. Following Lee and Kim (1999), we choose the three most prominent constructs to represent relationship quality: commitment, conflict and trust. Commitment refers to the degree of support and resources (personnel, financial resources, etc.) committed by the client and the vendor to the project. Conflict refers to the degree of incompatibility in activities, methods, and goals between a client and a vendor. Trust is defined as confidence in the other party's fulfillment of obligations and benevolence.

Based on previous IT outsourcing research, we expect relationship quality to be significant antecedents for KBS outsourcing success:

*Hypothesis 9a: Relationship commitment will have a positive effect on system quality.*

*Hypothesis 9b: Relationship commitment will have a positive effect on user satisfaction.*

*Hypothesis 10a: Relationship conflict will have a negative effect on system quality.*

*Hypothesis 10b: Relationship conflict will have a negative effect on user satisfaction.*

*Hypothesis 11a: Relationship trust will have a positive effect on system quality.*

*Hypothesis 11b: Relationship trust will have a positive effect on user satisfaction.*

### Research method

We adopt the field study methodology and use the questionnaire-based data collecting technique. We employ the PLS data analysis tool to estimate structural relationships in our model; this tool is suitable for a tight sample size and non-normal distributed data (Chin, 2003). Our unit of analysis is the organization.

### Measurement of variables

To ensure construct reliability and validity, we have developed our measurement based on previous literature as well as by adopting validated scales wherever possible. As for dependent variables, all the items are adopted from previous IS success studies (DeLone and McLean, 1992). For knowledge codifiability, we refer to Zander & Kogut's (1995) definition and measurement. The degree of knowledge codifiability is measured in terms of documentation (e.g., manuals, instructions, policies) of target task procedures and related information, and in terms of articulation through interviews and group discussions of un-recorded implicit knowledge. Absorptive capacity measures are adapted from Szulanski (1996). It is measured in terms of knowledge recipients' appreciation of critical matters in the domain area and their competence to assimilate and apply their knowledge learned. The measurement of outsourcing relationship is adopted from a number of prior empirical studies (Lee and Kim, 1999; Grover, Cheon, and Teng, 1996; Kern and Willcocks, 2000).

**Table 1. Descriptive statistics of respondent companies and their KBS**

<i>KBS Type</i>	<i>Frequency</i>	<i>Percent</i>
Credit rating system	20	33.3
Analytical CRM	7	11.7
Loan assessment system	24	40.0
Credit rating system & Loan assessment CRM	3	5.0
Others	6	10.0
<b>Total</b>	<b>60</b>	<b>100.0</b>

### Data collection

We administered the questionnaire to project managers in charge of KBS outsourcing projects in 60 organizations in the financial industry in Korea. From October 2003 to January 2004, we sent out research students to each of the 60 organizations to collect the data. The companies surveyed covered almost all organizations which implemented KBS in the financial industry in Korea. Profiles of these 60 respondents are summarized in Table 1 below. As the questionnaire had to be in Korean for use, it had undergone

back-translation by bilingual translators to ensure instrument equivalence of questions (Mullen MR, 1995; Singh J, 1995).

## Analysis and Results

### Construct reliability and validity

Constructs' face validity and content validity are established in the design process of a questionnaire and in its preview by experts. The results of construct reliability and validity tests for our study are shown in the appendix. Internal consistency, which is measured by composite reliability, is acceptable ranging from 0.818 to 0.935 (Chin 2003). For convergent validity, two tests are used: item-to-total correlation (output from SPSS) and Average Variance Extracted (AVE), which should be >0.5. As shown in the appendix, all AVE values in our study meet this requirement.

For discriminant validity, we examine whether  $AVE > \gamma^2$ , where  $\gamma^2$  is the squared correlation between two related constructs. This condition of discriminant validity is upheld in our study, as shown in Table 2

### Model testing

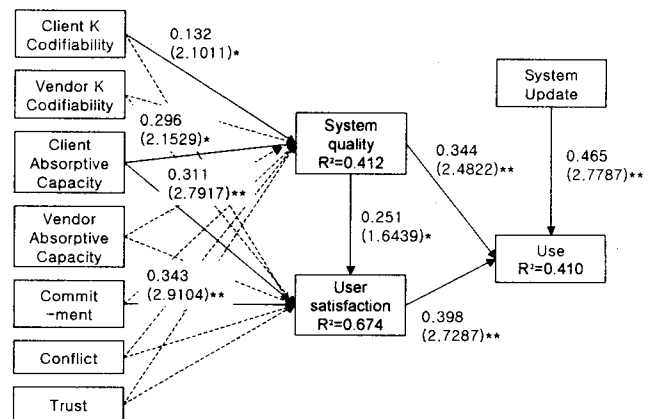
On validation of the constructs, we have run the measurement model through PLS Graph (version 3.00). Our hypothesis testing results are summarized in Figure 3.

Hypotheses 1 to 4 are supported: H1 ( $\beta= 0.344$ , t-statistic= 2.4822,  $p< 0.01$ ), H2 ( $\beta= 0.398$ , t-statistic= 2.7287,  $p< 0.01$ ), H3 ( $\beta= 0.251$ , t-statistic= 1.6439,  $p< 0.05$ ) and H4 ( $\beta= 0.465$ , t-statistic= 2.7787,  $p< 0.01$ ). The results confirm the relationships among the IS success model variables: system quality and user satisfaction are both found to have a strong positive effect on use; system quality also contributes to user satisfaction; and significant positive relationships exist between system update and system use, showing that specific service quality similar to system update can benefit the overall success of advanced IS such as KBS.

Among Hypotheses 5 – 11, H5a ( $\beta= 0.132$ , t-statistic= 2.1011,  $p< 0.05$ ), H7a ( $\beta= 0.296$ , t-statistic= 2.1529,  $p< 0.05$ ), H7b ( $\beta= 0.311$ , t-statistic= 2.7917,  $p< 0.01$ ), and H9 ( $\beta= 0.343$ , t-statistic= 2.9104,  $p< 0.01$ ) are supported, which is preliminary proof for the validity of applying the

knowledge sharing framework to the KBS outsourcing context. The higher the client's knowledge codifiability and absorptive capacity are, the higher the system quality of KBS would be. On the other hand, client absorptive capacity and commitment between client-vendor relationships would promote user satisfaction toward KBS.

Figure 3 Hypothesis testing results using PLS



Contrary to our expectations, two out of the three vendor-client relationship constructs turned out to have no impact on the success of KBS outsourcing despite the widely held belief that trust is the most essential factor for outsourcing success (Sabherwal R, 1999).

## Discussion

The findings generally support the major hypotheses in our proposed research model. The results suggest the importance of employing a knowledge management perspective in studying the outsourcing of knowledge-intensive IS such as KBS.

### KBS outsourcing success

Our findings support the reasoned relationships between the technical and semantic levels of IS success measures. This is a progress from previous IS outsourcing success studies that used single or a limited number of success variables.

Table 2. Correlation between constructs

	Use	UserSati	SysQual	Update	CliCodi	VenCodi	VenAb	CliAb	Commit	Conflict	Trust
Use	0.715										
UserSati	0.428	0.719									
SysQual	0.127	0.643	0.743								
Update	0.558	-0.477	-0.390	0.826							
CliCodi	0.093	0.420	0.442	-0.408	0.692						
VenCodi	0.089	0.561	0.448	-0.387	0.459	0.792					
VenAb	0.200	0.522	0.377	-0.428	0.242	0.640	0.827				
CliAb	0.461	0.607	0.501	-0.510	0.378	0.327	0.334	0.700			
Commit	0.264	0.673	0.517	-0.455	0.474	0.523	0.631	0.380	0.709		
Conflict	-0.207	-0.454	-0.285	0.288	-0.200	-0.452	-0.477	-0.204	-0.518	0.712	
Trust	0.195	0.553	0.429	-0.216	0.290	0.569	0.676	0.354	0.691	-0.555	0.776

\*The shaded numbers in the diagonal row are square roots of the average variance extracted.

Positive overall feelings for the system will lead to more frequent use and the use of more system functionalities, which in turn could bring about the desired technological and financial benefits at the organizational level. This is especially true for advanced computer applications such as KBS. In the case of an enterprise resource planning (ERP) system, it is very unlikely for employees not to use the system even though they are not satisfied with it because there are no alternatives. However, it is not the case for KBS where experts can manage their tasks without the assistance of such machines. Therefore, user satisfaction is essential to ensure actual use of KBS. Only when KBS are used, can the value of expertise be greatly amplified by the high-end technology. Likewise, good system quality is also essential as guarantee for more frequent use. Further, the cause-effect relationship between system quality and user satisfaction indicates that managers can promote satisfaction by constantly improving system quality.

Furthermore, our evidence shows that user satisfaction alone may be insufficient to secure actual use. System update also leads to increased system use. This finding implies the importance and necessity of investigating the special features of particular types of IS. Specific types of IS may need different considerations and attentions.

#### **Property of shared knowledge**

A high degree of codifiability of client knowledge means detailed documentation of target tasks and externalization of implicit knowledge residing in domain experts through various communication channels. Such preparation raises the level of transparency between client and vendor, and helps the vendor better understand users' needs and requirements; that, in turn, can be translated into tailored system design and more efficient system implementation. Thus, better knowledge codifiability is beneficial to system quality improvement.

#### **Property of organizations**

A higher absorptive capacity at the client organization indicates that employees at the client organization are familiar with KBS-related system development issues, and consequently, can speak the same language as the vendor, and can respond fast and appropriately to the vendor's expertise. Besides, timely appreciation of the vendor's expertise improves user's understanding of the implemented KBS and speeds up the learning process. As a result, users would be more competent in using the new KBS and therefore, they would be more satisfied with the system.

#### **Property of relationship between organizations**

We have found commitment to positively increase users' overall satisfaction. This finding helps to validate the third dimension: property of relationship between organizations, which has seldom been addressed in the knowledge sharing framework (Argote L, 1999; Argote, McEvily, and Reagans, 2003). However, conflict and trust are not proven to

influence user satisfaction despite strong theoretical support in previous research. Possible explanations can be: most respondents (58.3%) in this study had already had cooperative experience with current service providers. Therefore, situations of disagreement and conflict should have been experienced during their earlier cooperation. Moreover only trusted vendors would be invited for new projects. Also, 56.7% of the outsourcing contracts signed were tight contracts, which means many related issues had already been settled at the beginning.

However, this result should be interpreted with caution because it is based on only client-side responses while relationship quality depends on both sides. It is possible for the clients to have failed to provide correct information about the service provider.

#### **Implications for practitioners**

Using our model, KBS outsourcing practitioners can devote efforts to more focused areas. Contrary to some conventional thought about outsourcing, the client's own knowledge and expertise are still critical and even more important than the vendor's knowledge and expertise in the outsourcing environment. A number of implications may be derived from this observation. First, the client should strive to codify its knowledge. Sufficient documentation preparation concerning target tasks should be done before the KBS project is launched; this requirement should be communicated to the vendor. Second, the client should be aware of the importance of its own absorptive capacity when turning to the outsourcing option. Employees with relevant expertise and knowledge should be included in the project team to improve knowledge transfer between vendor and client. In addition to knowledge, effort should be devoted to nurturing a healthy relationship with service providers to build up commitment and mutual understanding during the outsourcing project. Lastly, more effort should be put into improving service quality in addition to system quality and user satisfaction. Proper updating and maintenance of KBS is also a key to the success of the KBS project.

#### **Conclusion**

A major motivation for this study has been to examine factors affecting the outsourcing success of a particular type of information systems: knowledge-based systems, which are particularly knowledge-intensive compared to transaction processing systems. To achieve our goal, we have integrated a new theoretical perspective from knowledge management and organizational learning into traditional IT/IS outsourcing research. The findings of the study suggest that knowledge-related factors: characteristics of knowledge and those of the organizations involved, together with conventional wisdom in inter-organizational relationships, are essential for the success of KBS outsourcing. Given the increasing importance of knowledge in organizations, these findings should prove useful for further investigation into success in the outsourcing of knowledge-intensive systems in general.

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