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Are Printed Documents Becoming Irrelevant? The Role of Perceived Usefulness of Knowledge Repositories in Selecting From Knowledge Sources

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Abstract:

Knowledge sourcing through knowledge repositories, people, and documents in organizational settings are investigated in this paper. This competition among the knowledge sources is modeled via the perceived usefulness and ease of use of a Knowledge Management System (KMS) and extends the work of Gray and Durcikova (2005-2006) by adopting the concept of competition among knowledge sources suggested by Zimmer et al (2007-2008). Results suggest that when a KMS is perceived to be useful, users tend to reduce the usage of printed documents as a source of knowledge. However, when a KMS is perceived to be useful and easy to use, knowledge sourcing from other individuals is not influenced. This suggests that while good quality KMS may be slowly replacing printed documents, they complement sourcing knowledge from colleagues rather than reducing it. Implications for future research and practice are offered.

Keywords: Knowledge management, knowledge based systems, IT adoption

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I. INTRODUCTION

In order to support continuous competitive advantage, companies are investing substantial resources to support more effective and efficient ways to access and exchange knowledge among employees [Alavi and Leidner, 2001a]. One of the initiatives in which companies engage is implementation of information technology based knowledge repositories, called knowledge management systems (KMS), that are designed to capture, store and disseminate employees' knowledge [Markus, 2001]. According to Gartner (cited in [McCormick, 2007]), companies spent $73 billion on KMS in 2007 and this number was predicted to grow at a rate of 18% per year. This large investment in KMS implementation was supported by the proposition that KMS would provide fast access to the most up to date, codified knowledge from anywhere in the world [Gray, 2001]. To leverage economies of scale [Gray and Durcikova, 2005-2006] employees are encouraged to source knowledge from the KMS before they consult any other sources of knowledge, such as their colleagues and printed documents. Also, as the mobility of the workforce increases, the availability of an ubiquitous knowledge source would seem to be preferred to one that is limited to a particular time and space. However, researchers and practitioners report that KMS are often under-utilized [e.g., Gallivan et al., 2003]. Thus, the main research question of this paper is: "*Under what circumstances will individuals seek knowledge from a KMS instead of other sources of knowledge (e.g., printed documents and other individuals)?*"

This paper presents and tests a model of knowledge sourcing from three competing sources; namely, KMS, other individuals, and printed documents. Knowledge sourcing can be defined as accessing expertise, experience, insight, and opinions. These may be stored in other employees' memory, KMS or printed documents [e.g, Gray and Meister, 2004, 2008]. While there may be many reasons for people to source knowledge [Morrison, 1993, Xu et al., 2006] our paper focuses on knowledge sourcing for problem solving that requires learning a new approach to generate a solution. We rely on adult learning theory [Gray and Meister, 2004, Houle, 1961, Knowles, 1980] that stresses the importance of intellectual demand and learning orientation for solving a problem to guide our understanding of which knowledge source will be used by an employee. In addition, we extend these antecedents by collaborative culture because this has been shown to be influential in knowledge management [Alavi and Leidner, 2001a]. When individuals source knowledge they have an option to use their interpersonal relationships (e.g., source knowledge from other individuals) that are categorized as relational [Zimmer et al., 2007-2008] or to source from previously codified sources of knowledge (e.g., printed documents or KMS) that are non-relational [Zimmer et al., 2007-2008].

Until now most studies that have examined KMS as a potential knowledge source were based on the Technology Acceptance Model (TAM) [Kankanhalli et al., 2001, King and Marks, 2008, Money and Turner, 2005, Watson and Hewett, 2006] and did not take into account other sources of knowledge that existed in the organizational environment for much longer (e.g., printed documents and other individuals). These studies found that perceived usefulness and ease of use were strong predictors of KMS use [e.g., Money and Turner, 2004]. Even though perceived usefulness and ease of use are well-established and consistent predictors of usage of KMS, knowledge sourcing from KMS, when other competing sources of knowledge are available to the user, has not been investigated. This study fills a gap in the literature and builds on the work of Gray and Durcikova [Gray and Durcikova, 2005-2006] by studying KMS acceptance while taking into account competing sources of knowledge (e.g., other individuals and printed materials) [Zimmer et al., 2007-2008] that are naturally present where these systems are implemented [Legris et al., 2003]. Our empirical results extend the nomological network for studying knowledge sourcing by integrating TAM into the existing theory of knowledge sourcing and provide three central theoretical contributions. First, the theoretical integration of three different knowledge sources suggests that perceived usefulness of KMS not only impacts knowledge sourcing from KMS but also impacts the choice of competing knowledge source. Second, our results show that the impact of perceived usefulness of KMS mediates the role of previously identified antecedents of knowledge sourcing from KMS (e.g., learning orientation and collaborative culture). Third, while several researchers pointed out the importance of collaborative culture [e.g., King et al., 2002], this study empirically confirms this effect on sourcing knowledge from competing sources.

This research has three implications for management. First, in order to support knowledge sourcing from a KMS, the system must be easy to use and perceived to be useful. This suggests that spending resources on these systems will be beneficial to an organization. Second, once a KMS is perceived to be useful and easy to use, the role of printed materials in sourcing knowledge slowly diminishes. Printed materials may become the "dinosaurs of the digital age" when KMS are perceived useful. Third, to properly support knowledge management in an organization, at least two knowledge sources are necessary: KMS and other individuals.

This paper is organized into five sections including the introduction. The next section presents theoretical rationale for the hypotheses proposed in this study. The third and the fourth sections discuss the research method and results, respectively. In the last section, the contribution to theory and practice and limitations of this study are discussed.

II. BACKGROUND AND HYPOTHESIS

The knowledge-based theory of the firm suggests that an organization's performance depends on how well it capitalizes on its knowledge resources and maintains its ability to create and integrate knowledge [Grant, 1996, Grant, 1997, Spencer, 1996]. Both researchers and practitioners have sought better ways to manage knowledge assets to improve an organization's performance and, ultimately, sustain its competitive advantages. Some organizations have paid attention to increasing the re-use rate of their organizational knowledge as much as possible [Markus, 2001], while others have focused their strategies on creating new knowledge [Levin et al., 1987]. These two strategic directions of knowledge management (KM) can also be adopted concurrently by an organization.

Many organizations that adopt the re-use oriented strategy focus their efforts on how to guide their employees to share their knowledge with others [Watson and Hewett, 2006] and how to access other employees' knowledge as much as possible [Maute and Forrester, 1993]. With the widespread use of information systems, the re-use based KM strategy often relies on knowledge repositories rather than relying on traditional methods of knowledge transfer (e.g., face-to-face inquiry and document-based learning) [Markus, 2001]. The decision whether to share knowledge with others depends not only on system characteristics of knowledge repositories [Agarwal, 2000], but also on individual costs and benefits associated with the sharing activities [Kankanhalli et al., 2005], individual motivations and social capital [Wasko and Faraj, 2005], and organizational climate [Bock et al., 2005]. Knowledge that has been shared has to be applied to a product, service or business process so that an organization and individual gain value from it. Thus we need to turn our attention to how people apply the knowledge that they possess or that which is shared. People particularly need to access available knowledge sources when they do not possess the necessary knowledge. Knowledge sourcing from a specific knowledge source (colleagues, documents or repositories) is determined by learning orientation, intellectual demands, time pressure, risk aversion, job position, job tenure, and/or ease of use of KMS [Gray and Durcikova, 2005-2006]. Zimmer et al. [2007-2008] argue that the specific knowledge sources (relational or non-relational resource) that will be used are also influenced by the quality of knowledge and the accessibility of the source, although sometimes external knowledge sources are preferred to internal sources because of their perception of scarcity [Menon and Pfeffer, 2003]. Although there are several frameworks that classify knowledge resources [e.g., Gray and Meister, 2004, Gray and Meister, 2006, Holsapple and Joshi, 2001, Spencer, 1996, Zimmer et al., 2007-2008], following Gray and Durcikova [2005-2006] this paper adopts three main types of knowledge sources that are used in organizational settings: knowledge repositories, people, and documents.

TAM and knowledge sourcing from a KMS

Previous studies that applied TAM to explain usage of KMS provide evidence that the more useful and easier to use individuals perceive a KMS to be, the greater their intention to use the KMS they have [e.g., Kankanhalli et al., 2001, King and Marks, 2008, Money and Turner, 2005]. In turn, intention positively impacts actual usage. The positive influence of perceived ease of use on perceived usefulness is also well established [e.g., Davis, 1989a, Davis et al., 1989, Venkatesh, 1996]. Two types of use are observed when using a KMS: knowledge sourcing [Gray and Meister, 2004] and knowledge sharing [Kankanhalli et al., 2005, Wasko and Faraj, 2005]. Although some papers have studied the two types of usage simultaneously [He and Wei, 2008, Watson and Hewett, 2006], in our study we focus on knowledge sourcing from a KMS. Although little explicit attention has been paid to why users source their knowledge from a KMS, some studies suggested antecedents for this behavior. For instance, Watson and Hewett [2006] suggested that the value of knowledge to be acquired, represented as perceived usefulness, and the accessibility of the knowledge, represented as ease of use, would be positively related to the frequency of knowledge re-use from a KMS. These two antecedents for knowledge sourcing were already shown to positively affect attitude towards KMS use and use itself in other contexts [Karahanna and Limayem, 2000, Karahanna and Straub, 1999, Lederer et al., 2000, Lee et al., 2003, Lucas and Spilter, 2000, Venkatesh, 1996, Venkatesh and Davis, 2000]. Hence, as demonstrated across different contexts and also in the KMS context, we hypothesize:

H1: Perceived usefulness of a knowledge repository will positively influence knowledge sourcing from the knowledge repository.

H2: Perceived ease of use of a knowledge repository will positively influence knowledge sourcing from the knowledge repository.

Communications of the Association for Information Systems

H3: Perceived ease of use of a knowledge repository will positively influence perceived usefulness of the knowledge repository.

TAM and knowledge sourcing from other individuals and documents

According to information seeking theory [Gerstenberger and Allen, 1968, O'Reilly, 1982], workers select their information sources based on the expected quality of the information and the accessibility of the sources. Zimmer and his colleagues [2007-2008] showed that the quality and accessibility of a source of knowledge not only influences individuals' choice of sourcing knowledge from that source, but also from other types of competing sources. When an attractive alternative exists and the attractiveness of the alternative is higher than that of the previous source, individuals may choose the alternative. The effects of an attractive alternative as a response to dissatisfaction with an option are observed across diverse disciplines, such as job choice [Dreher and Dougherty, 1980, McLaughlin and Butler, 1974, Pfeffer and Lawler, 1980, Rusbult et al., 1988], customer behavior when dissatisfied [Maute and Forrester, 1993], and separation and divorce among married couples [Ross and Sawhill, 1975, Rusbult et al., 1986]. One facet of system usability that has been shown to play an influential role in the development of perceptions of attractiveness is content usefulness, which refers to the perceived usefulness of the information provided by a system [Williamson et al., 2003]. We predict that perceived usefulness of a KMS will not only increase the likelihood of sourcing knowledge from a KMS (as hypothesized in H1), but it will also affect the other competing sources of knowledge. Thus, if an individual finds a KMS to be more useful than other sources of knowledge, other individuals and printed documents may no longer be the first choice for knowledge sourcing. Thus, people who perceive knowledge repositories to be a useful knowledge source will use other types of knowledge sources less frequently. This suggests the following hypotheses:

H4: Perceived usefulness of a knowledge repository will negatively influence knowledge sourcing from documents.

H5: Perceived usefulness of a knowledge repository will negatively influence knowledge sourcing from other individuals.

Antecedents to knowledge sourcing

Why do employees source knowledge when solving work related problems? To answer this question, we draw on adult learning theory [Houle, 1961, Knowles, 1980] that argues that learning behavior has two categories: learning can occur directly from work environment by experiential learning or experimentation, for example; and learning can occur from experiences of others. Sourcing knowledge from other individuals, a KMS, or printed documents is therefore a representation of learning from experiences of others [Gray and Durcikova, 2005-2006, Levitt and March, 1988] and is conceptually similar to a decision to pursue adult education but on a limited scale because of the restricted number of sources of knowledge a worker can use [Gray and Meister, 2004]. Now that we have a better understanding of sources that individuals can learn from, we turn to Houle [1961] and Knowles [1980] who argue that there are three reasons why individuals pursue adult education: (1) because they need to handle a real-life task or problem; (2) because they have a disposition towards learning; and (3) because they have a desire to engage in social interactions. The first two reasons have been operationalized by Gray and Meister [2004] as intellectual demand and learning orientation and were successfully used in other recent studies [e.g., Gray and Durcikova, 2005-2006]. Following the third reason, people also make decisions about getting involved in learning based on the outcome of interpersonal relationships brought about from participation in learning [Boshier, 1971]. Therefore, individual workers engage in learning in order to sustain a good relationship with other individuals. This is especially true when the culture of an organization supports collaboration [King et al., 2002]. Hence, we extend the adult learning theory by empirically examining the effect of collaborative culture in an organization and model it as an antecedent of knowledge sourcing.

To sum up, literature on adult education represents a good theoretical base for the KM context because [Gray and Durcikova, 2005-2006]: (1) the motivating factors are proximal to the learning behavior in question rather than being a representation of generic human motivation; and (2) it doesn't prefer any particular channel from which knowledge can be shared it is ideal to compare different channels through which individuals can source knowledge. Thus, as shown in previous research, we model the factors already shown to influence adult education (intellectual demand and learning orientation) as antecedents to knowledge sourcing from different sources (KMS, individuals, and documents). In addition, we extend these antecedents by collaborative culture because this represents a third reason why individuals engage in learning/knowledge sourcing and it has also been suggested by many researchers and practitioners to be influential in knowledge management [e.g., King et al., 2002]. Briefly, intellectual demand, learning orientation, and collaborative culture may influence knowledge sourcing from other individuals, a KMS ,and printed documents from a learning perspective.

Interestingly, the variables that influence knowledge sourcing choices were shown to also influence perceived usefulness and ease of use of a system. Numerous researchers have attempted to find antecedents to perceived usefulness and ease of use in TAM [e.g., Venkatesh, 1996]. Additionally, recent research labels KMS as being social systems [He and Wei, 2008] through which the community of KMS users interact. These external variables can be grouped into three categories [for summary see Lee et al., 2003]: (1) individual characteristics; (2) organizational characteristics; and (3) task characteristics. Specifically, it is found that individual factors (e.g., personal innovativeness, education level, self-efficacy and risk aversion) affect perceived usefulness and perceived ease of use [Agarwal and Karahanna, 2000, Agarwal and Prasad, 1999, Venkatesh, 1996]. Organizational factors, such as social influence and organizational culture, were significant predictors of perceived usefulness of KMS [He and Wei, 2008, Igbaria and Iivari, 1995, Karahanna and Limayem, 2000, Malhotra and Galletta, 1999]. In addition, task characteristics, for example, task complexity, intellectual demand, and time pressure, have been shown to have an impact on perceived usefulness [Dishaw and Strong, 1999b, Taylor and Todd, 1995]. Next we describe the effects of intellectual demand, learning orientation, and collaborative culture on knowledge sourcing.

Intellectual Demand

Intellectual demand is defined as the normal cognitive load perceived by individuals in performing their work [Gray and Durcikova, 2005-2006, Gray and Meister, 2004]. When individuals engage in intellectually demanding work it places a greater burden on their cognitive capacity, thus driving them to lower some portion of this demand by sourcing knowledge from already available sources [Gray and Durcikova, 2005-2006]. Knowledge sourcing from these external sources requires less effort than developing solutions to work problems and thus individuals that perceive high intellectual demand at their work will reduce the portion of this cognitive load by engaging in higher levels of sourcing knowledge from external sources, such as documents, KMS, and other individuals.

However, in order to better understand why individuals source knowledge from a KMS we need to understand the antecedents of the key TAM constructs [Venkatesh, 1996]. The TAM literature suggests that two beliefs, perceived usefulness and ease of use, determine one's intention and subsequent use of information technology [e.g., Davis, 1989b]. KMS are implemented to make the work of knowledge workers easier and thus reduce their intellectual demand by removing some of the cognitive load through sourcing knowledge rather than reinventing solutions to work problems. Thus, a good task-technology fit will not only positively influence the perception of usefulness of a KMS [Dishaw and Strong, 1999a] but also its ease of use [Mathieson and Keil, 1998]. Thus we hypothesize that:

> *H6: Higher intellectual demand will positively influence (a) knowledge sourcing from documents, (b) perceived usefulness of a KMS, (c) ease of use of a KMS, and (d) knowledge sourcing from other individuals.*

We don't hypothesize a direct effect of intellectual demand (and the other two antecedents) on sourcing knowledge from KMS, but rather we model it as a mediated relationship via ease of use of a KMS and perceived usefulness of a KMS. This is because ease of use and perceived usefulness of a KMS have been shown to be the direct antecedents of KMS use and thus the effect of environmental characteristics should be modeled as mediated through them [e.g., Bock et al., 2005]. However, ease of use and perceived usefulness of a KMS (as opposed to ease of use and perceived usefulness of sourcing knowledge via colleagues/printed documents) are not antecedents to either sourcing knowledge from colleagues or printed documents, thus we model the effect of intellectual demand as having a direct effect on sourcing knowledge from other individuals or printed documents. We follow this logic while developing hypotheses for both learning orientation and collaborative culture.

Learning orientation

Learning orientation is defined as a relatively stable disposition toward learning [Gray and Meister, 2004]. Although there are differences in individuals' extent to which they seek to acquire new knowledge [Dweck and Elliott, 1983], individuals with strong learning orientation are more likely to source knowledge to improve their skills and abilities [Gray and Durcikova, 2005-2006]. In addition, the higher the learning orientation of an individual the better the performance because this individual directs more effort towards learning [Brett and VandeWalle, 1999]. Thus, learning orientation is an important predictor of knowledge sourcing behavior. When knowledge workers are not able to resolve problems on their own, they will source knowledge from printed documents (e.g., manuals available to them) and other individuals. However, previous research [Gray and Durcikova, 2005-2006] showed that individuals with strong learning orientation do not perceive KMS as a source of knowledge when learning is their goal. Gray and Durcikova (2005-2006) argue that KMS contain mostly procedural knowledge [Nahapiet and Ghoshal, 1998] that focuses on "know how to solve the problem" rather than declarative knowledge ("why a problem happens") to speed up the applicability of the solution. Thus, the non-inclusion of the details and the 'why' for the problem thus reduces the perceived usefulness of KMS for those individuals with higher learning orientation.

Similarly, we predict that stronger learning orientation will positively influence ease of use. As stated above, learning orientation is the extent to which an individual seeks to acquire new knowledge [Dweck and Elliot, 1983]. Individuals with stronger learning orientation will perceive that using a KMS requires less effort because it allows them to solve a problem that is assigned to them and it also allows them to become more efficient with a new technology. Thus we hypothesize that:

> *H7: Stronger learning orientation will (a) positively influence knowledge sourcing from documents, (b) negatively influence perceived usefulness of a KMS, (c) negatively influence ease of use, and (d) positively influence knowledge sourcing from other individuals.*

Collaborative culture

Culture, specifically collaborative culture, has been given prominent importance as an enabler of successful knowledge management practices [Alavi and Leidner, 2001b, King et al., 2002, Teece, 1998] including knowledge sourcing too. We define collaborative culture as a work atmosphere where people learn from each other, where there is a sense of teamwork, and where competition among employees is not destructive. In such a culture people believe in their organization and freely share and source knowledge from each other via traditional means (e.g., other colleagues or printed manuals) or also via newly introduced means such as KMS. KM research found that collaborative or cooperative culture in organizations improves knowledge activities such as usage and sharing [De Long and Fahey, 2000, Goh, 2002] because employees are not afraid to ask for help when they do not know how to approach a work problem. Thus, when individuals believe that their organization supports collaborative culture they will source knowledge from resource available to them more than when they perceive the culture to be competitive [Orlikowski, 1993].

Among organizational factors, collaborative culture [Orlikowski, 1993], has been shown to be also important when it comes to information systems characteristics [He and Wei, 2008, Legris et al., 2003, Wang and Benbasat, 2005]. Previous research showed [He and Wei, 2008] that individuals perceive KMS that allows them to edit or augment each other's knowledge as a place for social interaction. People who perceive that their environment supports collaboration will produce a higher quality and quantity of knowledge that they can share via a KMS. Thus, when knowledge workers who perceive their work environment to support collaboration source knowledge from a KMS, they will find this knowledge useful because they expect their colleagues to submit useful knowledge. Similarly, individuals working in a culture that supports collaboration are more friendly and helpful to their colleagues and the knowledge they share via a KMS is written in a way that is more readable and understandable for their colleagues. Thus, people who perceive their culture to be supportive of collaboration will perceive the KMS to be easy to use. However, because printed documents represent a non-relational knowledge source [Zimmer et al., 2007-2008] that does not require interaction between people, the usage of this source of knowledge will decrease in an environment with high collaborative culture. Thus we hypothesize that:

> *H8: Collaborative culture will (a) negatively influence knowledge sourcing from documents, (b) positively influence perceived usefulness of KMS, (c) positively influence ease of use of a KMS, and (d) positively influence knowledge sourcing from other individuals.*

Furthermore, we included several control variables that have been shown to influence knowledge sourcing in previous research: time pressure, risk aversion, job tenure, analyst level (1 or 2), and organization. Specifically, both time pressure and risk aversion has been shown to decrease knowledge sourcing from a KMS [Gray and Durcikova, 2005-2006]. Therefore we included these two variables as controls. The final research model with the hypotheses are shown in Figure 1.

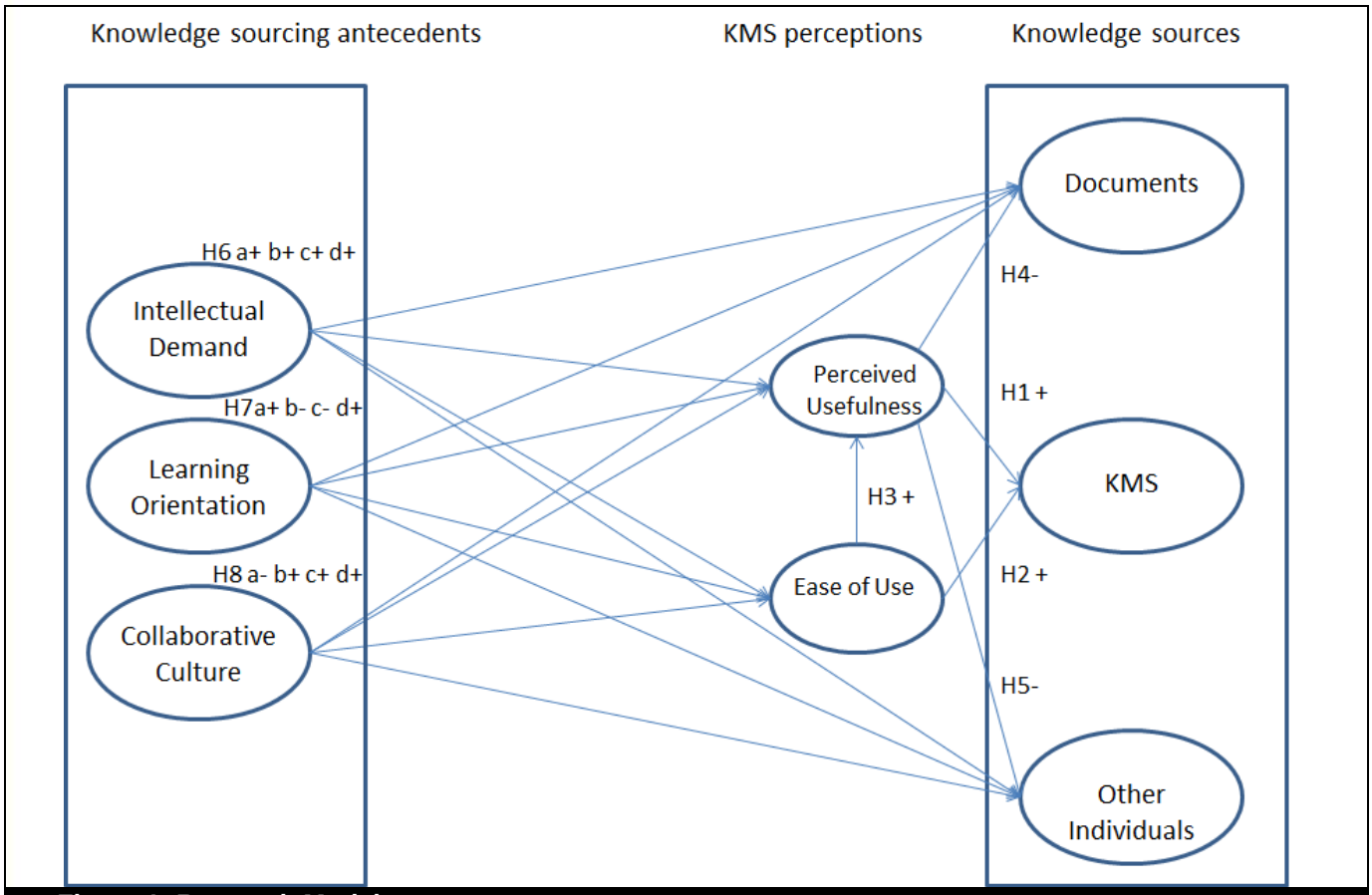


Figure 1: Research Model

Method

In order to test the model proposed by this study, we approached a vendor of a KMS who agreed to sponsor the study. The sponsor provided us with a list of 26 organizations that used their KMS. A letter explaining this study, together with a letter of support from our sponsor, was mailed to the organizations. Two weeks after the letters were mailed we contacted each organization by phone. Seven companies (two manufacturing firms, two health care organizations, two information technology firms and a media company) agreed to participate in the survey. In all of these companies the KMS was used for more than two years, therefore early implementation problems were not expected in this study. The use of KMS was not mandatory in any of these organizations but employees were encouraged to consult the KMS as often as possible. Employees were not only able to submit knowledge to the system, but the system also allowed them to edit and augment the knowledge that was submitted previously. Before a knowledge article was released (either new submission or updated article) it was checked for validity by an employee or team of employees whose role was to serve as reviewers. Employees were able to use a natural language search engine to search for knowledge (the interface was very similar to any major search engine). A total of 150 invitations to fill out a web-based survey were emailed out. We received 110 usable responses for a 73% response rate. Subjects of this survey were technical help desk support analysts. The technical help desk provides customers with assistance in solving problems on software, hardware, and networking with their computers [Das, 2003, El-Sawy and Bowles, 1997, Gray and Durcikova, 2005-2006]. The respondents ranged in age from 26 to 64 years (average 42 year old); 35% were females. Average job tenure and organizational tenure of the respondents was five years (1~24 years) and nine years (1~37 years), respectively. Sixty-eight percent of our subjects worked as an analyst at level 1. Level 1 represents the first contact with a customer who needs help with their IT. In case a level 1 analyst cannot resolve a customer's problem, the problem is escalated to a level 2 analyst. Level 2 analysts, in general, possess more expertise in a specialty area. Thirty-two percent of the analysts that completed our survey were level 2 analysts.

Sample and Procedure

A cross-sectional survey was designed following Dillman's methodology [Dillman, 1978]. All constructs used in the survey were adapted from previous studies. Knowledge sourcing from each knowledge source was adapted from Gray and Durcikova [2005-2006]. Perceived usefulness and perceived ease of use were measured using Davis

[1989a]. Learning orientation and intellectual demand were adapted from Gray and Meister [2006]. Risk aversion was adapted from Cable and Judge [1994]. Five items of measuring time pressure were adapted from Koy and DeCotiis [1991]. The perceptions of teamwork and cooperation among employees were adapted from Zandvliet and

Table 1:Construct and Measure Items

Construct	Items	
	Symbol	Description
Knowledge sourcing from knowledge repositories	KMS1	I rarely use the knowledge repository as a way of acquiring knowledge (R)
	KMS2	I frequently check in the knowledge repository when I need to improve my knowledge on a topic or issue
	KMS3*	When I am working on a challenging problem, I often look in the knowledge repository to find solutions to similar problems
Knowledge sourcing from documents	DOC1	When I'm working on a work related problem, I often refer to documents outside the knowledge repository
	DOC2	I often obtain useful knowledge for solving work problems by reading documents other than articles in the knowledge repository
	DOC3*	I rarely read documents other than the knowledge repository articles to increase my knowledge on topics or issues related to work (R)
Knowledge sourcing from people	OTI1	I frequently discuss problems with people at my organization when I need to improve my knowledge on a topic or issue related to work
	OTI2*	I rarely discuss work problems with other employees to acquire work-related knowledge(R)
	OTI3	When I'm working on a difficult problem, I often communicate with employees who may have encountered similar issues
Perceived usefulness of knowledge repositories	PU1	Using the knowledge repository in my job enables me to solve problem more quickly
	PU2*	Using the knowledge repository improves my job performance
	PU3	Using the knowledge repository in my job increases my productivity
	PU4	Using the knowledge repository enhances my effectiveness on the job
	PU5	Using the knowledge repository makes it easier to do my job
	PU6	I find the knowledge repository useful in my job
Perceived ease of use of knowledge repositories	EOU1	The knowledge repository has been easy for me to learn
	EOU2	I find it easy to get the knowledge repository to do what I want to do
	EOU3	The method of interacting with the knowledge repository is clear
	EOU4	I find the knowledge repository flexible to work with
	EOU5	It is easy for me to become skillful at using the knowledge repository
	EOU6	Overall, I find the knowledge repository easy to use
Intellectual demand	ITD1	It takes a lot of concentration, focus and effort to perform well in this job
	ITD2*	My work is actually quite easy (R)
	ITD3	My job is intellectually very demanding
	ITD4	"Challenging" would be a good way to describe my job
Learning orientation	LOR1	I am willing to select a challenging work assignment that I can learn a lot from
	LOR2	I enjoy challenging and difficult tasks at work where I'll learn new skills
	LOR3	I often look for opportunities to develop new skills and knowledge
Collaborative culture	CLC1	People at this organization pitch in to help each other out
	CLC2	We co-operate with each other when working on a work related problem
	CLC3	There is a sense of teamwork at this organization
	CLC4	We learn from each other in this organization
	CLC5	You are on your own when you have a problem in this organization (R)
	CLC6	The competition among employees in this organization is destructive (R)
Time pressure	TPR1	I have too much work and too little time to do it
	TPR2*	I find this organization a relaxed place to work (R)
	TPR3*	I often have to deal with work related problems in my off hours
	TPR4	I feel like I never have a day off
	TPR5	Many employees at my level get "burned out" by the demands of their jobs in this organization
Risk aversion	RSA1	I am a cautious person who generally avoids risk
	RSA2*	I am very willing to take risks when choosing a job or project to work on (R)
	RSA3	I usually play it safe, even if it means occasionally losing out on a good opportunity

Note: * measure items dropped for final analysis; (R) reverse-coded items

Stracker [2001]. All items were measured on a 7-point Likert scale, where one and seven mean 'strongly disagree' and 'strongly agree', respectively. The instrument was pretested with PhD students and faculty, and finally refined by one practitioner from each organization. In the context of this study, analysts used product manuals to consult potential solutions and referred to them as 'documents outside the knowledge repository'. Given that the system they supported was proprietary, they could not use any other documents in electronic form outside their company. The items for all ten constructs employed in this paper are shown in Table 1.

Results

Measurement model

Before testing our model, confirmatory factor analysis (CFA) was performed using IBM™ Statistical Analysis Software (SPSS -version 16.0). As a result, five of the forty-two items (a drop rate of 11.9%) that loaded less than 0.7 on their respective construct were dropped [Carmines and Zeller, 1979]. Next, internal consistency was assessed by calculating composite reliability (CR) and Cronbach's alpha to verify the strength of the measures. Composite reliabilities for all ten constructs were higher than 0.7, the recommended value according to Nunnally [1978]. All observed Cronbach's alpha values for the constructs, except for one (knowledge sourcing from other individuals), also met Nunnally's criteria. However, Cronbach's alpha is known to be biased against short scales [Carmines and Zeller, 1979] and therefore CR should be used. Further, average variance extracted (AVE) [Fornell and Larcker, 1981], which measures the average amount of variance that a construct captures from its indicators relative to the amount of measurement error, was calculated for each construct. All constructs exceeded the 0.5 value [Chin, 1998] meaning that at least 50% of the constructs' variance was accounted for by its respective indicators. Finally, convergent and discriminant validity were examined in two ways [Straub et al., 2004, page 394]: (1) comparison of the square root of AVE for each construct that exceeded all respective inter-construct correlations, (2) comparison of the correlation coefficient of each item on its substantive construct and other constructs. Due to cross-loadings, another three items (KMS3, PU2, and RSA2) were dropped from the analysis. Thirty-four items remained (see Table 1). Table 2 shows the correlations between constructs, and the square root of AVE is shown on the diagonal. Multicollinearity was not deemed a problem because all Variance Inflation Factors (VIF) were very close to 1 [Mansfield and Helms, 1982]. It can be seen that the square root of AVE for each construct is much higher than any intercorrelation. Following Straub et al. [2004], the independent and dependent variables were separated to test for convergent and discriminant validity (see Table 3 and Table 4 for results). All the items load much more on their respective constructs than on other unrelated constructs and all cross-loadings are smaller than 0.45. Therefore, both convergent and discriminant validity have been established.

Table 2: Descriptive Statistics, Correlations, and Square Root of AVE (on the diagonal)

Constructs	# of items	Mean	Std. Dev	CR	Cronbach's alpha	AVE	1	2	3	4	5	6	7	8	9	10
1 Knowledge sourcing from KMS	2	4.691	1.541	0.887	0.744	0.797	**0.893**									
2 Knowledge sourcing from documents	2	5.223	1.048	0.876	0.713	0.780	-0.289	**0.883**								
3 Knowledge sourcing from other individuals	2	5.718	0.887	0.845	0.632	0.731	0.046	0.334	**0.855**							
4 Perceived usefulness	5	4.836	1.412	0.973	0.964	0.876	0.762	-0.288	0.097	**0.936**						
5 Ease of use	6	4.594	1.449	0.941	0.924	0.727	0.495	-0.066	0.088	0.630	**0.853**					
6 Intellectual demand	3	5.564	0.910	0.884	0.801	0.717	0.108	0.194	0.403	0.181	0.131	**0.847**				
7 Learning orientation	3	5.761	0.996	0.901	0.834	0.753	0.017	0.257	0.228	0.003	0.239	0.172	**0.868**			
8 Collaboration OC	6	5.083	1.247	0.926	0.900	0.678	0.302	0.051	0.402	0.473	0.410	0.137	0.236	**0.823**		
9 Time pressure OC	3	4.370	1.379	0.863	0.759	0.677	-0.310	0.078	0.048	-0.384	-0.284	0.161	-0.137	-0.516	**0.823**	
10 Risk aversion	2	3.309	1.271	0.891	0.751	0.803	-0.149	0.044	0.096	-0.042	-0.036	0.064	-0.404	-0.005	0.113	**0.896**

Harmon's single factor test and a technique described as "controlling for the effects of a single unmeasured latent method factor" [Podsakoff et al., 2003, page 894] were used to test for common method variance (CMV). Following Podsakoff and Dalton [1987], CMV was tested via factor analysis. The procedure extracted 7 factors explaining 72.2% of the variance in the underlying data. No single factor had significant loadings for all items. The second method described by Podsakoff et al. [2003], and used by Liang et al. [2007] and Vance, Elie-Dit-Cosaque, and Straub [2008], yielded 9 significant paths out of the 34 paths from CMV to a single indicator construct (see Appendix A). The results demonstrate that the average substantively explained variance of the indicators is 0.760, while the

Communications of the Association for Information Systems

average method-based variance is 0.016. The ratio of substantive variance to method variance is about 47:1. This indicates a small amount of common methods variance and therefore it is unlikely to be a serious concern for this study. Harmon's single factor test and the CMV test "controlling for the effects of a single unmeasured latent method factor" were performed by using SPSS (version 16.0) and Smart (Partial Least Square)PLS version 2.0 [Malhotra et al., 2006, Ringle et al., 2005, Vance et al., 2008], respectively.

Table 3: Factor Analysis for Dependent Variables

Items	1	2	3
KMS1	**0.838**	-0.295	0.014
KMS2	**0.919**	0.013	0.070
DOC1	-0.055	**0.908**	0.072
DOC2	-0.203	**0.785**	0.192
OTI1	-0.037	0.387	**0.749**
OTI3	0.110	-0.017	**0.910**
Note: PCA, Varimax rotation			

Table 4: Factor Analysis for Independent Variables

Items	1	2	3	4	5	6	7
PU1	**0.867**	0.201	-0.014	-0.054	0.216	0.075	0.047
PU3	**0.850**	0.338	0.096	-0.041	0.134	0.143	-0.003
PU4	**0.871**	0.343	0.105	-0.051	0.174	0.116	-0.094
PU5	**0.846**	0.333	0.089	-0.034	0.162	0.180	-0.075
PU6	**0.743**	0.442	0.134	-0.029	0.210	0.230	-0.020
EOU1	0.215	**0.830**	-0.033	0.213	0.057	0.017	0.047
EOU2	0.366	**0.717**	0.062	0.025	0.176	0.107	0.015
EOU3	0.248	**0.725**	0.031	0.256	0.199	0.025	0.080
EOU4	0.186	**0.732**	0.094	-0.191	0.223	0.192	-0.106
EOU5	0.244	**0.852**	0.042	0.170	0.016	0.052	-0.010
EOU6	0.238	**0.892**	0.031	0.044	0.131	0.074	-0.049
ITD1	-0.017	0.111	**0.861**	-0.008	0.068	-0.081	0.013
ITD3	0.146	-0.110	**0.810**	0.133	0.058	-0.115	0.064
ITD4	0.116	0.125	**0.806**	0.123	0.084	-0.038	0.017
LOR1	0.019	0.055	0.083	**0.839**	0.171	0.085	-0.160
LOR2	-0.073	0.130	0.125	**0.855**	0.063	0.005	-0.088
LOR3	-0.135	0.200	0.052	**0.722**	0.145	0.061	-0.314
CLC1	0.086	0.081	0.088	0.163	**0.873**	0.047	0.004
CLC2	0.174	0.055	0.034	0.099	**0.828**	0.078	0.086
CLC3	0.102	0.210	-0.009	0.076	**0.823**	0.270	0.190
CLC4	0.158	0.146	0.193	0.160	**0.778**	0.144	-0.126
CLC5	0.291	0.123	0.075	0.019	**0.537**	0.428	0.076
CLC6	0.243	0.274	-0.083	-0.092	**0.672**	0.306	-0.236
TPR1	-0.089	-0.005	0.283	-0.154	-0.170	**0.696**	0.024
TPR4	-0.196	-0.181	-0.006	0.043	-0.201	**0.773**	-0.056
TPR5	-0.151	-0.088	0.068	-0.057	-0.217	**0.808**	0.161
RSA1	0.004	0.077	0.043	-0.186	0.128	0.002	**0.867**
RSA3	-0.090	-0.070	0.057	-0.273	-0.064	-0.091	**0.817**
Note: PCA, Varimax rotation							

Structural model

All proposed hypotheses were tested using SmartPLS 2.0 [Ringle et al., 2005]. Figure 2 and Table 5 show the results of the model testing in detail. First, 60.0% of the variance in knowledge sourcing from knowledge repositories is explained by our model. As expected, when adopting TAM to explain sourcing behavior from a KMS, the hypothesized effect of perceived usefulness on knowledge sourcing (H1, β=0.725, p<0.01) and the effect of perceived ease of use on perceived usefulness (H3, β=0.552, p<0.01) are supported by our data. However, the second hypothesis in TAM, the effect of ease of use on knowledge sourcing from a KMS, is not significant (H2, β=0.028). Learning orientation (H7b, β=-0.223, p<0.05), and collaborative culture (H8b, β=0.200, p<0.05) have significant influence on perceived usefulness. Ease of use is significantly influenced only by collaborative culture (H8c, β=0.276, p<0.01).

Second, our model explains 31.7% of the variance in knowledge sourcing from documents. As predicted, perceived usefulness of KMS negatively influences knowledge sourcing from documents (H4, β=-0.364, p<0.01). In addition, sourcing from documents is also significantly determined by intellectual demand (H6a, β=0.178, p<0.10 marginal support) and learning orientation of an individual (H7a, β=0.221, p<0.05). Collaborative culture had no effect on sourcing knowledge from documents (β=0.113).

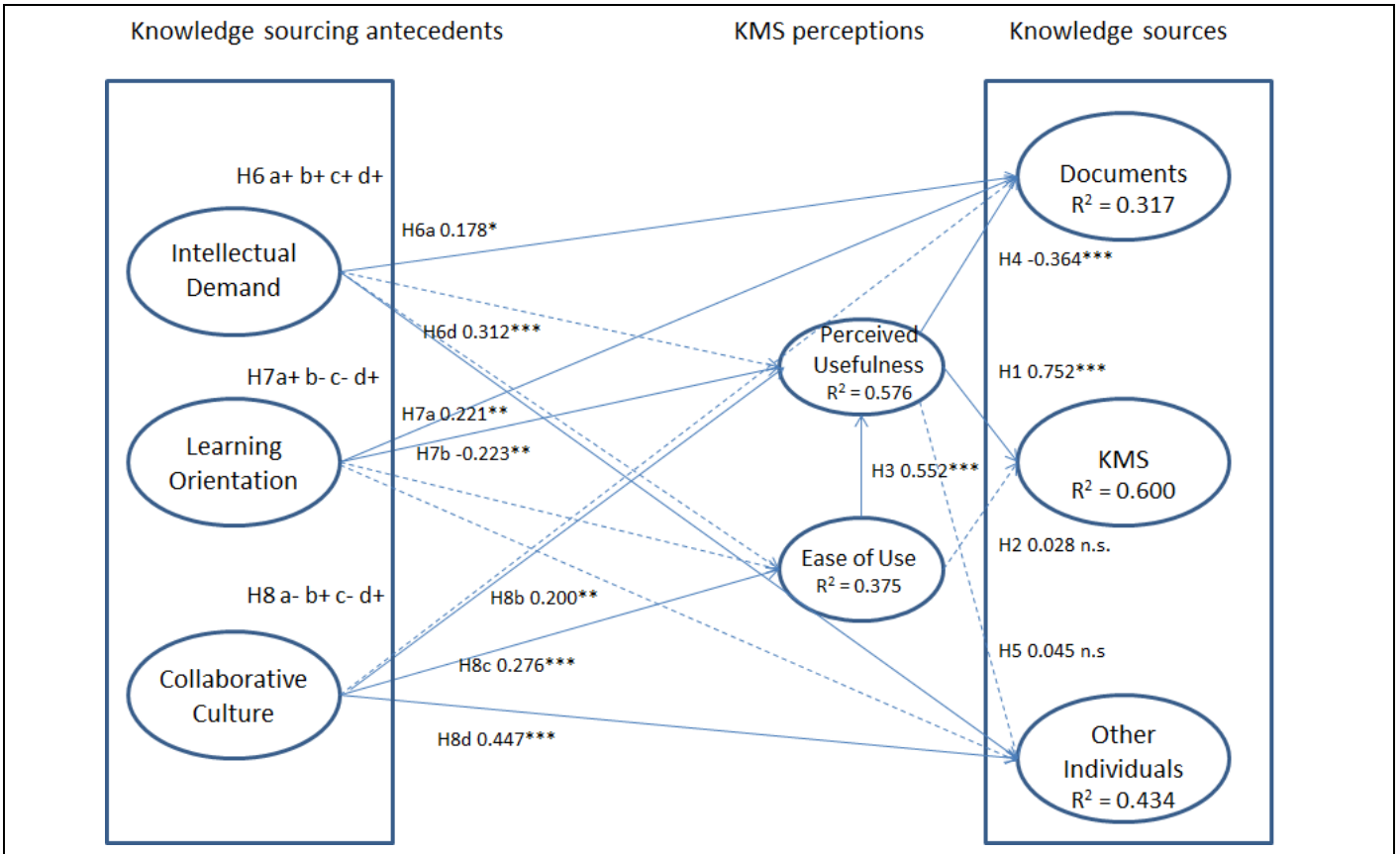
Third, 43.4% of the variance in knowledge sourcing from other individuals is explained by our model. Two factors significantly influence this dependent variable, namely, intellectual demand (H6d, β=0.312, p<0.01) and collaborative culture (H8d, β=0.447, p<0.01). However, the effect of perceived usefulness on knowledge sourcing from other individuals (H5, β=0.045) is not supported by our data.

The effect of five control variables (time pressure, risk aversion, level, tenure, and organization) was modeled the same way as the effect of intellectual demand, learning orientation and collaborative culture. Time pressure had a negative effect on ease of use (β=-0.215, p<0.1 marginal support) and positive effect on sourcing knowledge from other individuals (β=0.194, p<0.1 marginal support). Risk aversion did not significantly influence any of the dependent variables. Tenure positively influenced ease of use (β=0.124, p<0.1 marginal support). The seven companies that participated in the study differed at their degree to which employees sourced knowledge from other individuals (specifically, organizations 2 and 4). Also, they differed in the degree to which they perceived the KMS to be easy to use what is interesting given that they all used the same version of the KMS (specifically, organizations 3, 4, 5, and 6).

Table 5: Hypotheses and Results

	Dependent variables – knowledge sourcing from			Mediators	
	KMS	DOC	OTI	PU	EOU
Mediators					
PU	0.752***	-0.364***	-0.045	--	--
EOU	0.028	--	--	0.552***	--
Antecedents					
ITD	--	0.179*	0.312***	0.126	0.152
LOR	--	0.221**	0.164	-0.223**	0.008
CLC	--	0.113	0.447***	0.200**	0.276***
Control variables					
TPR	--	0.020	0.194*	-0.165	-0.215*
RSA	--	0.214	0.177	-0.105	-0.045
Level	--	-0.017	0.074	-0.085	-0.038
Tenure	--	-0.131	0.071	-0.004	0.124*
Organization 2	--	0.007	0.245*	-0.047	-0.052
Organization 3	--	0.079	0.042	0.050	-0.293**
Organization 4	--	0.148	0.250*	0.099	-0.449***
Organization 5	--	-0.012	0.231	-0.060	-0.450***
Organization 6	--	0.030	0.153	-0.092	-0.277**
Organization 7	--	0.142	0.079	-0.097	-0.092
R^2	**0.600**	**0.317**	**0.434**	**0.576**	**0.375**

Note: Significance levels (two-tailed) are * p<0.10, ** p<0.05, *** p<0.01



Note: Significance level (two-tailed) are indicated as follows: ***p<0.01, **p<0.05, and *p<0.10; Dashed lines represent non-significant relationships

Figure 2: Emerging Model

In conclusion, the perception of an individual about KMS in terms of usefulness decreases knowledge sourcing from documents and has no effect on sourcing knowledge from other individuals. Perceived usefulness of KMS is affected by the two antecedents (learning orientation and collaborative culture). Perceived ease of use of KMS is only significantly influenced by collaborative culture. Furthermore, individuals' positive attitude toward learning has a negative impact on their perceived usefulness of KMS; also, perception of time pressure in work environment produces a negative impact on ease of use of a KMS. In addition, individuals directly determine whether or not they will be sourcing knowledge from other individuals and this depends on their perceptions of intellectual demand, collaborative culture, and time pressure. Total effects of these independent variables on different knowledge sources are presented in Table 6. However, only intellectual demand and learning orientation positively affect the choice to source knowledge from documents.

Table 6: Total Effects of Antecedents on Utilized Knowledge Sources

	Dependent Variables		
Antecedents	**Documents**	**Other Individuals**	**KMS**
Intellectual Demand	0.18	0.32	n.s.
Learning Orientation	0.30	n.s.	-0.17
Collaborative Culture	-0.06	0.45	0.26
Time Pressure	n.s.	0.19	-0.14
Risk Aversion	n.s.	n.s.	n.s.

Discussion

We expand on knowledge sourcing theory [Gray and Meister, 2004] and competing knowledge sources available to employees when solving work related problems [Gray and Durcikova, 2005-2006] by examining the influence of

perceived usefulness and ease of use of KMS on sourcing knowledge from KMS, printed documents, and other individuals. Findings of this study provide strong support for the proposed model that hypothesized the mediating role of perceived usefulness of KMS on the selection of a knowledge source. The results of this study establish that usage of KMS as a knowledge source is influenced by perceived usefulness of KMS (H1), which is influenced by perceived ease of use (H2); however, there is no direct influence of perceived ease of use on sourcing knowledge from a KMS (H3). The results also demonstrate that while perceived usefulness of KMS does not influence sourcing knowledge from other individuals (H5), it decreases knowledge sourcing from printed documents (H4). Now we discuss the antecedents to use each knowledge source individually.

Sourcing knowledge from KMS

Consistent with previous research [e.g., Kankanhalli et al., 2001, King and Marks, 2008, Money and Turner, 2005], sourcing knowledge from KMS is influenced by perceived usefulness of KMS (H1), and perceived usefulness is affected by perceived ease of use of the system (H2). The effect of perceived ease of use on sourcing knowledge from KMS (H3) is not statistically significant in our study. Previous research shows mixed results for H3 [for review see Gefen and Straub, 2000, King and He, 2006, Lee et al., 2003, Legris et al., 2003]. Lee and colleagues [2003] report that only 58 out of 101 studies examined showed significant results on the direct effect of perceived ease of use on usage of information systems. Therefore, we need to investigate whether the effect of ease of use is fully mediated by perceived usefulness. The correlation between ease of use and sourcing knowledge from KMS is 0.495; the Sobel test of mediation [Baron and Kenny, 1986, Sobel, 1982] confirmed the significance of the paths at the 99.9% significance level (see Table 5 for the effects of control variables). Therefore, our results confirm that the effect of ease of use on knowledge sourcing from KMS is completely mediated through perceived usefulness. The total effect of ease of use is 0.415, which means that building KMS that are easy to use is a necessary but not sufficient condition for knowledge sourcing from KMS. Nevertheless, without useful content these systems will not be used [Keil et al., 1995, Lee et al., 2003].

The influence of learning orientation (H7b) and collaborative culture (H8b) on sourcing knowledge from KMS is fully mediated by perceived ease of use and perceived usefulness (this was also confirmed by the non-significant direct paths as suggested by Baron and Kenny [1986]). Intellectual demand (H6b) was not found to be a significant predictor of either perceived usefulness or ease of use of KMS, thus did not affect sourcing knowledge from a KMS. While this result may seem surprising, a recent study [Saastamoinen et al., 2012] found that the higher the task complexity, what is one dimension of intellectually demanding work [Gray and Meister, 2004], the less employees source knowledge from KMS and the more they relied on other individuals, their own notes and manuals, and finally resources available online. Thus, our study confirms these results and builds on the results of previous studies [Gray and Durcikova, 2005-2006]. Learning orientation had a negative influence on perceived usefulness of a KMS (H7b). This is consistent with prior research [Gray and Durcikova, 2005-2006] which found that people who have higher learning orientation source knowledge from KMS less frequently. Therefore, when individuals want to learn, they prefer to use printed documents rather than KMS to solve the task at hand. Collaborative culture positively influences sourcing knowledge from KMS via both perceived usefulness and ease of use (H8b and H8c). Previous research [King et al., 2002] revealed the prominent importance of culture as a significant challenge of successful KM, and other researchers and practitioners alike have identified culture as the most significant KM challenge [e.g., Alavi and Leidner, 2001b, Teece, 1998]. Even though organizational culture encompass diverse characteristics such as assumptions and beliefs among organizational members, values, or artifacts [Alavi et al., 2006], KM research found that it is the collaborative or cooperative culture in organizations that improves knowledge activities such as usage and sharing [De Long and Fahey, 2000, Goh, 2002]. In addition, Orlikowski [1993] specifically stressed that even groupware did not prompt the usage within the system when an organization does not have collaborative culture but rather individualistic and competitive cultures. While we characterized KMS as a non-relational resource [Zimmer et al., 2007-2008], the findings in this study suggest that employees may not necessarily see these systems as non-relational. The KMS in this study allowed employees not only to enter new knowledge entries but also to edit entries previously created, which is a type of collaboration that we could characterize as a relational resource. Some KMS therefore may be characterized as being a partly-relational resource and that is why collaborative culture influences the perceptions of usefulness, ease of use, and sources.

Interestingly, even though the correlation between perceived usefulness of KMS and learning orientation is only 0.003 and non-significant, this relationship was found to be significant and negative in our path model. This represents a typical case of a suppressor variable (Maassen and Bakker 2001, Wasko and Faraj 2005). A suppressor variable is a variable that has a zero-order correlation with the dependent variable but does correlate with one or more independent variables and leads to improved prediction in multiple regression and path models (Maassen and Bakker 2001). Suppressor variable explains residual variance in the dependent variable after controlling for the effects of other variables (Wasko and Faraj 2005). We investigated the suppressor impact by removing variables from the model and checking if the suppressor effect of learning orientation still remained. We found that ease of use, intellectual demand, and collaborative culture must be in the model to get the suppressor

effect (by removing all these three variables the β coefficient went from -0.251 to -0.080 and non-significant). Thus, while learning orientation has a weak positive correlation with perceived usefulness, once the impact of ease of use, intellectual demand and collaborative culture are taken into account, employees with low learning orientation will find the KMS to be particularly useful. This finding extends the work of Gray and Durcikova (2005-2006), who showed that employees with low learning orientation find it particularly conducive to rely on the solutions in the KMS, by explaining under what circumstances this is true. These employees rely on the knowledge in the KMS when the system is easy to use, when their job puts them under lot of intellectual demand and when they know they can count on their fellow employees, who, through collaboration on knowledge entries, created a valuable resource for them to use. Future research should investigate this interesting finding in more detail.

In addition to the these three motivations, time pressure significantly negatively influenced perceived usefulness of KMS and had no effect on ease of use. This result suggests that individuals perceive finding knowledge from KMS under time pressure to be time consuming. This is consistent with previous research [Gray and Durcikova, 2005-2006] that found that when under pressure employees tend to source less knowledge from their KMS. However, risk aversion of individuals does not affect either perceived usefulness of KMS or perceived ease of use.

Sourcing knowledge from documents

When individuals perceive a KMS to be useful, their usage of printed documents significantly decreases (H4). Following Zimmer et al.'s classification [2007-2008] of knowledge sourcing methods, KMS and printed documents are non-relational knowledge sources that do not need interpersonal contact. Therefore, the replacement of printed documents by KMS can be explained by the fact that they both belong to the same non-relational knowledge source category, and if individuals find one of them to be useful (e.g., KMS) there is no need to source knowledge from the other one (e.g., printed documents). This is consistent with previous research on non-relational knowledge sources where, for example, individuals use the Internet to source knowledge rather than a library when they perceive the library to be less useful [Christensen and Bailey, 2000]. Thus, this might be a sign that printed documents are ready to be replaced by KMS that is easy to use and contains useful knowledge and information. Printed documents may become "'dinosaurs of the electronic age" that will soon be extinct when KMS are implemented properly.

Among the individual and organizational context variables, only intellectual demand and learning orientation directly influenced sourcing knowledge from documents. Intellectual demand (H6a) positively influences the choice of sourcing knowledge from printed documents in organizational settings. The results proved to be consistent with previous research that suggests that when individuals encounter tasks that demand higher cognitive loads, the individuals tend to reduce the cognitive load by borrowing existing knowledge from any kinds of sources [Gray and Meister, 2004]. Learning orientation (H7a) also has a significant effect on sourcing from printed documents. Individuals with higher learning orientation tend to choose printed documents as a knowledge source. The preference of individuals for printed documents can be explained by the modern education system. Both students and adults consider reading a cornerstone of success [Karim and Hasan, 2007]. Printed documents (e.g., books) have historically been used for learning and are regarded as one of the primary sources for learning. This paradigm among people, leading to the choice of printed documents that occurs without self-instruction, is called a habit [Thompson et al., 1991]. We did not find any direct influence of collaborative culture (H8a) on sourcing knowledge from printed documents. This could be explained because reading documents is mostly an individual action that does not require collaboration with others. The two control variables, time pressure and risk aversion, also have no effect on sourcing knowledge from printed documents.

Interestingly, two variables influence sourcing from documents indirectly. First, learning orientation indirectly influences sourcing knowledge from printed documents through perceived usefulness of KMS, and as a result, strengthens the usage of printed documents for sourcing knowledge (total effect is 0.3, see Table 6). Thus, individuals that have a high learning orientation prefer printed documents to KMS when learning a body of knowledge. Second, individuals' choice of sourcing knowledge from printed documents is indirectly influenced by collaborative culture (total effect mediated through both perceived usefulness and ease of use is -0.06, see Table 6). The more an organization supports collaboration, the less the employees tend to source knowledge from printed documents as they are a non-relational resource [Zimmer et al., 2007-2008]. Risk aversion and time pressure showed no significant effect on the two antecedents of TAM (perceived usefulness and perceived ease of use). Therefore, individuals use printed documents as a knowledge source when their job is intellectually demanding (direct effect), when their learning orientation is high, and when they belong to an organization which does not support collaboration.

Sourcing knowledge from individuals

When individuals perceive a KMS to be useful it has no effect on sourcing knowledge from other individuals (H5). Based on Zimmer et al.'s [2007-2008] classification, other individuals can be categorized as a relational source of

knowledge and therefore are fundamentally different from KMS and printed documents that are categorized as non-relational sources of knowledge. This explains why perceptions of usefulness of a KMS have no effect on sourcing knowledge from individuals. Additionally, previous research [Kock, 2004] suggests that humans are 'designed' for face-to-face communication. Therefore, information systems or KMS will not be able to completely replace face-to-face communication unless the interactions with KMS are more 'natural' (e.g., similar to face-to-face communication) [Kock, 2004].

The choice of sourcing knowledge from other individuals is influenced by intellectual demand, collaborative culture, and time pressure. When individuals encounter an intellectually demanding task, they tend to source knowledge from other individuals (H6d). This is consistent with previous research [Gray and Durcikova, 2005-2006, Gray and Meister, 2004] that found that individuals who face higher intellectual demand are inclined to utilize the existing knowledge from other individuals rather than from other sources (e.g., KMS and printed documents). As in the case of knowledge sourcing from KMS, collaborative culture has a positive impact on sourcing knowledge from other individuals (H8d). Interestingly, people source knowledge from other individuals when they perceive that they are under time pressure.

In conclusion, for individuals to choose KMS as a knowledge source it must be easy to use and contain useful knowledge. In addition, intellectual demand and collaborative culture strengthen knowledge sourcing from a KMS, while learning orientation and time pressure negatively influence the use of a KMS as a knowledge source. When individuals perceive a KMS to be useful and the work culture supports collaboration they tend not to use printed documents and prefer a KMS or other individuals. Even though individuals perceive a KMS to be useful, their choice to source knowledge from other colleagues is not affected.

Implications for theory

Our study makes several contributions to theory. First, the theoretical integration of TAM into knowledge sourcing theory [Gray and Meister, 2004] implies that perceived usefulness of a KMS impacts sourcing knowledge from KMS and mediates the role of some previously identified antecedents of knowledge sourcing (e.g., intellectual demand and learning orientation). It also demonstrates a more comprehensible explanation for understanding why some antecedents of knowledge sourcing theory (e.g., learning orientation and time pressure) negatively affect sourcing knowledge from KMS. Furthermore, building on the work of Zimmer et al [2007-2008], our understanding of the impact of KMS is broadened by showing that individuals' beliefs about KMS (e.g., perceived usefulness) influence not only KMS use behavior itself, but also their use of other sources of knowledge (e.g., printed documents and other individuals).

Second, our empirical results are consistent with the three motivators of adult learning: (1) a need to complete a task or goal; (2) dispositional enjoyment toward learning; and (3) a desire to engage in social interaction [Houle, 1961]. The previous studies on knowledge sourcing explained the choice of knowledge sourcing only using intellectual demand and learning orientation. Our findings broaden the previous research by showing that collaborative culture, a representation of engagement in social interactions, influences both knowledge sourcing from KMS [Fu and Lee, 2006, Talja et al., 2007] and knowledge sourcing from other individuals.

Third, this study offers implications for TAM in the context of knowledge management. Many papers used the two main antecedents of system use (perceived usefulness and perceived ease of use) in TAM to explain usage behavior of knowledge sourcing from KMS (e.g., [Bock et al., 2005]). However, most studies were only able to demonstrate the influence of perceived usefulness, but not perceived ease of use, on KMS use [Bock et al., 2006, He and Wei, 2008, Kankanhalli et al., 2001]. This can be caused by the fact that these studies tested only the direct effect of the two antecedents in TAM on KMS usage. Only Money and Turn [2005] tested the mediating effect of perceived usefulness on sourcing knowledge from KMS; however, their study used only correlation analysis to show empirical support. To our knowledge, this is the first study that shows evidence of the fully mediated effect of ease of use via perceived usefulness on KMS use in the knowledge sourcing context.

Fourth, this study extends the body of knowledge on the antecedents of perceived usefulness and perceived ease of use. Specifically, collaborative culture had a strong positive effect on both perceived usefulness and ease of use of a KMS. Thus, this study fills in a gap in the literature and studies KMS usage in the organizational environment where it was implemented where other sources of knowledge naturally occur [Orlikowski and Iacono, 2001].

Implications for practice

This research offers three implications for practitioners. First, as shown by our results, building KMS that are easy to use is a necessary but not sufficient condition for individuals to source knowledge from a KMS. One approach for managers to increase the ease of use of a KMS is to make it more easily searchable [Durcikova and Brown, 2007]

and create a more 'natural' interface that is similar to face-to-face interaction [Kock, 2004]. Furthermore, given that ease of use is fully mediated by perceived usefulness, managers need to make sure that the knowledge in the system will be useful, as without useful content these systems will not be used [Keil et al., 1995, Lee et al., 2003]. Specific resources should be set aside to create content that is perceived useful by all groups of potential users [for review see Markus, 2001].

Second, printed documents seem to be less important when a KMS contains useful knowledge and is easily searchable. Printed materials may become the "dinosaurs of the digital age" and allowing digitalization of knowledge offers significant monetary savings for any business. Clearly, the codification strategy of any company can be done electronically without the use of printed manuals. Moreover, this effect of moving away from printed materials can be strengthened by focusing on the creation of collaborative culture in a company.

Third, the behaviors of sourcing knowledge from KMS and other individuals are independent activities that one engages in when help is needed in arriving at a solution to a work problem. Humans are designed to primarily talk face-to-face with other humans and therefore no KMS can replace this type of knowledge sourcing [Kock, 2004]. Therefore, every company has to have a personalization strategy in place to successfully support KM in their company. Consistent with prior research [Alavi et al., 2006], collaborative culture has a positive effect on sourcing from other individuals. Thus managers who adopt personalization strategies should also support collaborative culture.

In conclusion, every company should adopt both codification and personalization strategies [Hansen et al., 1999] to successfully support its knowledge management efforts. Particularly, collaborative culture supports both personalization and codification strategies, and resources and processes should be created to support collaboration among employees.

Limitations and future research

From a methodological perspective, this study is subject to the expected limitations of cross-sectional survey-based research, such as an inability to conclusively determine causality. Because of this, future research should investigate whether printed documents can make KMS less useful in the eyes of KMS users. In addition, both the independent and dependent variables were collected from one source; however, tests of common method bias proved to be non-significant. Future studies should collect hard data on sourcing knowledge from KMS, documents and other individuals.

Although seven organizations participated in the study, all of them used the same KMS. This may influence the generalizability of our results to different types of KMS. Another issue that may influence the generalizability of our results to other populations is that all of our subjects were help desk analysts. Future research should investigate this model by including a variety of KMS and collect data from environments that significantly differ from that of help desk analysts.

From a theoretical standpoint, although we included three sources of knowledge, other sources of knowledge were surely available to our subjects. Future research should include potential knowledge sources such as online forums or web searches to expand this research [Saastamoinen et al., 2012]. In addition, while there was an overlap in the context of KMS and printed documents, we did not check the exact overlap of content. Thus, it could have happened that some knowledge was only available through one source. Future research should examine the overlap of knowledge between different sources so that more precise predictions regarding knowledge sources could be made.

The results of this study suggest three opportunities for future research. First there is an opportunity to adopt the construct of "naturalness" of interaction with a system that was suggested by Kock [2004]. Our results failed to show that perceived usefulness of KMS will negatively influence sourcing knowledge from other individuals. However, systems that are more 'natural' in their interaction with an individual and mimic an interaction with another person may actually negatively influence sourcing knowledge from individuals.

Another opportunity for future research should focus on individual habits when choosing a knowledge source. Particularly, Liu [2005] found that reading patterns of individuals have been changed due to the widespread use of the Internet, electronic documents, and multimedia resources. This suggests a possible shift in reading patterns where we see that individuals are moving away from printed documents and rather choosing digital sources of knowledge [Karim and Hasan, 2007, Liu, 2005]. Of interest to the current study is the work of He and Wei [2008] that identified habit as a moderator to continued knowledge sharing. It is possible that KMS that are perceived useful are changing the habit of sourcing knowledge from printed documents or it could be that younger individuals that are used to source knowledge from digital sources are starting to enter the work force.

The last opportunity for future research is to study knowledge sourcing and knowledge sharing simultaneously. Our study demonstrates that collaborative culture has an important role in individuals' choices of a knowledge source. Collaborative culture has also been identified as a critical factor for knowledge sharing [Bock et al., 2006]. Therefore, the behavior of individuals relevant to knowledge, both sourcing and sharing, can be understood by an integrated framework.

III. CONCLUSION

This paper extended the work of Gray and Durcikova [2005-2006] by adopting the concept of competing knowledge sources suggested by Zimmer et al. [2007]. This competition is modeled via perceived usefulness and ease of use of a KMS when individuals can choose among three knowledge sources: KMS, other individuals and printed documents. Printed documents seem to play a less important role as a knowledge source when individuals perceive KMS to be useful, and as such they are becoming the "dinosaurs of the electronic age". However, usefulness of KMS has no effect on sourcing knowledge from other individuals. Therefore, for a company to successfully support their knowledge management efforts it must support both sourcing knowledge from KMS and other individuals. Furthermore, creating an environment that supports collaboration will reinforce the use of both these knowledge sources.

REFERENCES

Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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Agarwal, R. (2000) Individual Acceptance of Information Technologies. Cincinnati: Pinnaflex Educational Resources Inc.

Agarwal, R. and E. Karahanna (2000) "Time flies when your're having fun: cognitive absorption and beliefs about information technology usage," MIS Quarterly (24) 4, pp. 665-694.

Agarwal, R. and J. Prasad (1999) "Are individual differences germane to the acceptance of new information technologies?," Decision Science (30) 2, pp. 361-391.

Alavi, M., T. R. Kayworth, and D. E. Leidner (2006) "An Empirical Examination of the Influence of Organizational Culture on Knowledge Management Practice," Journal of Management Information Systems (22) 4, pp. 191-224.

Alavi, M. and D. E. Leidner (2001a) "Review: knowledge management and knowledge management systems: conceptual foundations and research issues," Management Information Systems Quarterly (25) 1, pp. 107-136.

Alavi, M. and D. E. Leidner (2001b) "Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues," MIS Quarterly (25) 1, pp. 107-136.

Baron, R. and D. A. Kenny (1986) "The moderator-mediator variable distinction in social psychological research: Coneptual, strategic, and statistical considerations.," Journal of Personality and Social Pscyhology (51pp. 1173-1182.

Bock, G. W., A. Kankanhalli, and S. Sharma (2006) "Are norms enough? The role of collaborative norms in promoting organizational knowledge seeking," European Journal of Information Systems (15) 4, pp. 357-367.

Bock, G. W., R. W. Zmud, Y. G. Kim, and J. N. Lee (2005) "Behavioral Intention Formation in Knowledge Sharing: Examinating the Roles of Extrinsic Motivations, Social-Psychological Forces, and Organizational Climate," MIS Quarterly (29pp. 87-111.

Boshier, R. (1971) "Motivational, orientations of adult education participants: a factor analytic exploration of Houle's typology," Adult Education Journal (21) 2, pp. 3-26.

Brett, J. F. and D. VandeWalle (1999) "Goal orientation and goal content as predictors of performance in a training program," Journal of Applied Psychology (84) 6, pp. 863.

Cable, D. M. and T. A. Judge (1994) "Pay preferences and job search decisions: a person-organization fit perspective," Personnel Psychology (47pp. 317-348.

Carmines, E. G. and R. A. Zeller (1979) Reliability and validity assessment. Beverly Hills, CA: Sage Publications, Inc.

Chin, W. W. (1998) The partial least squares approach for structural equation modeling. Mahwah, NJ: Lawrence Erlbaum.

Christensen, E. W. and J. R. Bailey. (2000) Repository choice: an exploration of accessibility, satisfaction and usefulness. the 33rd Hawaii International Conference on System Sciences, Hawaii, 2000.

Das, A. (2003) "Knowledge and productivity in technical support work," Management Science (49) 4, pp. 416-431.

Davis, F. D. (1989a) "Perceived usefulness, perceived ease of use, and user acceptance information technology," MIS Quarterly (13) 3, pp. 319-340.

Davis, F. D. (1989b) "Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS quarterly pp. 319-340.

Davis, F. D., R. Bagozzi, and P. R. Warshaw (1989) "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," Management Science (35) 8, pp. 982-1003.

De Long, D. W. and L. Fahey (2000) "Diagnosing cultural barriers to knowledge management," The Academy of Management Executive (14) 4, pp. 113-127.

Dillman, D. A. (1978) Mail and Telephone Surveys. New York: John Wiley& Sons.

Dishaw, M. T. and D. M. Strong (1999a) "Extending the technology acceptance model with task-technology fit constructs," Information & Management (36) 1, pp. 9-21.

Dishaw, M. T. and D. M. Strong (1999b) "Extending the technology acceptance model with task-technology fit constructs," Information & Management (36pp. 9-21.

Dreher, G. F. and T. W. Dougherty (1980) "Turnover and competition for job openings: an exploratory analysis," Academy of Management Journal (23pp. 766-772.

Durcikova, A. and S. A. Brown. (2007) Influence of system, environment, and procedures on knowledge submission frequency. the 40th Hawaii International Conference on System Science, Hawaii, 2007.

Dweck, C. S. and E. S. Elliott (1983) Achievement motivation, in, vol. 4Handbook of child psychology, New York: Wiley, pp. 643-691.

El-Sawy, O. A. and G. Bowles (1997) "Redesigning the customer support process for the electronic economy: insight from storage dimensions," MIS Quarterly (21) 4, pp. 457-483.

Fornell, C. and D. Larcker (1981) "Evaluating structural equation models with unobservable variables and measurement error," Journal of Marketing Research (18) 1, pp. 39-50.

Fu, S. S. S. and M. K. O. Lee. (2006) Explaining IT-based knowledge sharing behavior with IS continuance model and social factors. PACIS 2006, 2006.

Gallivan, M. J., J. Eynon, and A. Rai (2003) "The challenge of knowledge management systems: Analyzing the dynamic processes underlying performance improvements initiatives.," Information Technology & People (16) 3, pp. 326-352.

Gefen, D. and D. Straub (2000) "The relative importance of perceived ease of use in IS adoption: a study of e-commerce adoption," Communications of AIS (1) 8, pp. 1-28.

Gerstenberger, P. and T. Allen (1968) "Criteria used by research and development engineers in the selection of an information source," Journal of Applied Psychology (52pp. 272-279.

Goh, S. C. (2002) "Managing effective knowledge transfer: an integrative framework and some practice implications," Journal of Knowledge Management (6) 1, pp. 23-30.

Grant, R. M. (1996) "Toward a knowledge-based theory of the firm," Strategic Management Journal (17) Winter special issue, pp. 109-122.

Grant, R. M. (1997) "The knowledge-based view of the firm: implications for management practice," Long Range Planning (30) 3, pp. 450-454.

Gray, P. H. (2001) "A problem-solving perspective on knowledge management practices," Decision Support Systems (31) 1, pp. 87-102.

Gray, P. H. and A. Durcikova (2005-2006) "The role of knowledge repositories in technical support environment: speed versus learning in user performance," Journal of Management Information Systems (22) 3, pp. 159-190.

Gray, P. H. and D. B. Meister (2004) "Knowledge sourcing effectiveness," Management Science (50) 6, pp. 821-834.

Gray, P. H. and D. B. Meister (2006) "Knowledge sourcing methods," Information & Management (43pp. 142-156.

Hansen, M. T., N. Nohria, and T. Tierney (1999) "What's your strategies managing knowledge?," Harvard Business Reivew (77) 2, pp. 106-116.

He, W. and K.-K. Wei (2008) "What drives continued knowledge sharing? An investigation of knowledge-contribution and -seeking beliefs," Decision Support Systems (46) 4, pp. 826-838.

Holsapple, C. W. and K. D. Joshi (2001) "Organizational knowledge resources " Decision Support Systems (31pp. 39-54.

Houle, C. O. (1961) The Inquiring Mind. Madison: University of Wisconsin Press.

Igbaria, M. and J. Iivari (1995) "The effects of self-efficacy on computer usage," Omega (23) 6, pp. 587-603.

Kankanhalli, A., B. C. Y. Tan, and K.-K. Wei. (2001) Seeking knowledge in electronic knowledge repositories: an exploratory study. the 22nd International Conference on Information Systems, 2001.

Kankanhalli, A., B. C. Y. Tan, and K.-K. Wei (2005) "Contributing knowledge to electronic knowledge repositories: an empirical investigation," MIS Quarterly (29) 1, pp. 113-143.

Karahanna, E. and M. Limayem (2000) "E-mail and V-mail usage: generalizing across technologies," Journal of Organizatinoal Computing and Electronic Commerce (10) 1, pp. 49-66.

Karahanna, E. and D. W. Straub (1999) "The psychological origins of perceived usefulness and ease-of-use," Information & Management (35pp. 237-250.

Karim, N. S. A. and A. Hasan (2007) "Reading habits and attitude in the digital age: analysis of gender and academic program differences in Malaysia," The Electronic Library (25) 3, pp. 285-293.

Keil, M., P. M. Beranek, and B. R. Konsynski (1995) "Usefulness and ease of use: field study evidence regarding task considerations," Decision Support Systems (13) 1, pp. 75-91.

King, W. R. and J. He (2006) "A meta-analysis of the technology acceptance model," Information & Management (43pp. 740-755.

King, W. R., P. V. Marks Jr., and S. McCoy (2002) "The most important issues in knowledge management," Communications of the ACM (45) 9, pp. 93-97.

King, W. R. and P. V. Marks (2008) "Motivating knowlege sharing through a knowledge management system," Omega (36pp. 131-146.

Knowles, M. S. (1980) The Modern Practice of Adult Education. New York: Adult Education.

Kock, N. (2004) "The psychological model: towards a new theory oc computer-mediated communication based on Darwinian evolution," Organization Science (15) 3, pp. 327-348.

Koys, D. J. and T. A. DeCotiis (1991) "Inductive measures of psychological climate," Human Relations (44) 3, pp. 265-285.

Lederer, A. L., D. J. Maupin, M. P. Sena, and Y. Zhuang (2000) "The technology acceptance model and the World Wide Web," Decision Support Systems (29) 3, pp. 269-282.

Lee, Y., K. A. Kozar, and K. R. T. Larsen (2003) "The technology acceptance model: past, present, and future," Communications of AIS (12) 752-780.

Legris, P., J. Ingham, and P. Collerette (2003) "Why do people use information technology? A critical review of the technology acceptance model," Information & Management (40pp. 191-204.

Levin, R. C., A. K. Klevorick, R. R. Nelson, S. G. Winter et al. (1987) "Appropriating the Returns from Industrial Research and Development," Brookings Papers on Economic Activities (1987) 3, Special Issue on Microeconomics, pp. 783-831.

Levitt, B. and J. G. March (1988) "Organizational learning," Annual Review of Sociology (14pp. 319-338.

Liang, H., N. Saraf, Q. Hu, and Y. Xue (2007) "Assimilation of enterprise systems: the effect of institutional pressure and the mediating role of top management," MIS Quarterly (31) 1, pp. 59-87.

Liu, Z. (2005) "Reading behavior in the digital environment: changes in reading behavior over the past ten years," Journal of Documentation (61) 6, pp. 700-712.

Lucas, H. C. and V. K. Spilter (2000) "Implementation in a world of workstations and networks," Information & Management (38) 2, pp. 119-128.

Malhotra, N. K., S. S. Kim, and A. Patil (2006) "Common method variance in IS research: a comparison of alternative approaches and a reanalysis of past research," Management Science (52) 12, pp. 1865-1883.

Malhotra, Y. and D. F. Galletta. (1999) Extending the technology acceptance model to account for social influence: theoretical bases and empirical validation. the 32nd Hawaii International Conference on System Science, Hawaii, 1999.

Mansfield, E. R. and B. P. Helms (1982) "Detecting Multicollinearity," The American Statistician (36) 3, pp. 158-160.

Markus, M. L. (2001) "Toward a Theory of Knowledge Reuse: Types of Knowledge Reuse Situations and Factors in Reuse Success," Journal of Management Information Systems (18) 1, pp. 57-93.

Mathieson, K. and M. Keil (1998) "Beyond the interface: Ease of use and task/technology fit," Information & Management (34) 4, pp. 221-230.

Maute, M. F. and W. R. Forrester (1993) "The structure and determinants of consumer complaint intentions and behavior," Journal of Economic Psychology (14pp. 219-247.

McCormick, J. (2007) "5 Big Companies That Got Knowledge Management Right," CIO Insight, 2013).

McLaughlin, G. W. and R. P. Butler (1974) "Use of weighting and data on alternative careers to predict retention and commitment," Jouranl of Applied Psychology (59pp. 87-89.

Menon, T. and J. Pfeffer (2003) "Valuing Internal vs. External Knowledge: Explaining the Preference for Outsiders," Management Science (49) 4, pp. 497-513.

Money, W. and A. Turner. (2004) Application of the technology acceptance model to a knowledge management system. 2004, pp. 9 pp.

Money, W. and A. Turner (2005) "Assessing knowledge management system user acceptance with the technology acceptance model," International Journal of Knowledge Management (1) 1, pp. 8-26.

Morrison, E. W. (1993) "Newcomer information seeking: Exploring types, modes, sources, and outcomes," Academy of Management Journal (36) 3, pp. 557-589.

Nahapiet, J. and S. Ghoshal (1998) "Social capital, intellectual capital, and the organizational advantage," Academy of Management Review (23) 2, pp. 242-266.

Nunnally, J. C. (1978) Psychometric Theory, 2nd edition. New York: McGraw-Hill.

O'Reilly, C. A. (1982) "Variations in decision maker's use of information sources: the impact of quality and accessibility of information," Academy of Management Journal (25) 4, pp. 756-771.

Orlikowski, W. J. (1993) "CASE tools as organizational change: investigating incremental and radical changes in systems development," MIS Quarterly (17) 3, pp. 309-340.

Orlikowski, W. J. and C. S. Iacono (2001) "Desperately seeking the'IT'in IT research-a call to theorizing the IT artifact," Information Systems Research (12) 2, pp. 121-134.

Pfeffer, J. and J. Lawler (1980) "Effects of job alternatives, extrinsic rewards, and behavioral commitment on attitude toward the organization: a field test of the insufficient justification paradigm," Administrative Science Quarterly (25pp. 38-56.

Podsakoff, P. M. and D. R. Dalton (1987) "Research methodology in organizational studies," Journal of Management (13) 2, pp. 419-441.

Podsakoff, P. M., S. B. MacKenzie, and N. P. Podsakoff (2003) "Common method biases in behavioral research: a critical review of the literature and recommended remedies," Journal of Applied Psychology (88) 5, pp. 879-903.

Ringle, C. M., S. Wende, and A. Will (2005) Smart PLS. Hamburg, Germany: University of Hamburg.

Ross, H. L. and I. V. Sawhill (1975) Time of Transition: The Growth of Families Headed by Women Washington, DC: Urban Institute.

Rusbult, C. E., D. Farrell, G. Roger, and A. G. Mainous (1988) "Impact of exchange variables on exit, voice, loyalty and neglect: an integrative model of response to declining job satisfaction," Academy of Management Journal (31pp. 599-627.

Rusbult, C. E., D. J. Johnson, and G. D. Morrow (1986) "Determinants and consequences of exit, voice, loyalty and neglect: responses to dissatisfaction in adult romanic relationships," Human Relations (39) 45-63.

Saastamoinen, M., S. Kumpulainen, and K. Jarvelin. (2012) Task Complexity and Information Searching in Administrative Tasks Revisited. Proceedings of the 4th Information Interaction in Context Symposium, IIIX 2012, pp. 204- 12.

Sobel, M. E. (1982) Asymptotic intervals for indirect effects in structural equations models, in S. Leinhart (Ed.) Sociological methodology, San Francisco: Jossey-Bass, pp. 290-312.

Spencer, J. (1996) "Making Knowledge the basis of a Dynamic Theory of the Firm," Strategic Management Journal (17) Winter Special Issue, pp. 45-62.

Straub, D., M.-C. Boudreau, and D. Gefen (2004) "Validation guidelines for IS positivist research," Communications of AIS (13pp. 380-427.

Talja, S., P. Vakkari, J. Fry, and P. Wouters (2007) "Impact of research cultures on the use of digital library resources," Journal of the American Society for Information Science and Technology (58) 11, pp. 1674-1685.

Taylor, S. and P. A. Todd (1995) "Understanding information technology usage: a test of competing models," Information Systems Research (6) 2, pp. 145-176.

Teece, D. J. (1998) "Research directions for knowledge management," California Management Review (40) 3, pp. 289-292.

Thompson, R. L., C. A. Higgins, and J. M. Howell (1991) "Personal computing toward a conceptual model of utilizatoin," MIS Quarterly pp. 125-143.

Vance, A., C. Elie-Dit-Cosaque, and D. W. Straub (2008) "Examining trust in information technology artifacts: the effects of system quality and culture," Journal of Management Information Systems (24) 4, pp. 73-100.

Venkatesh, V. (1996) "A model of the antecedents of perceived ease of use development and test," Decision Science (27) 3, pp. 451-481.

Venkatesh, V. and F. D. Davis (2000) "A theoretical extension of the technology acceptance model: four longitudinal field studies," Management Science (46) 2, pp. 186-204.

Wang, W. and I. Benbasat (2005) "Trust in and adoption of online recommendation agents," Journal of the Association for Information Systems (6) 3, pp. 72-101.

Wasko, M. M. and S. Faraj (2005) "Why should I share? Examining social capital and knowledge contribution in electronic networks of practice," MIS Quarterly (29) 1, pp. 35-57.

Watson, S. and K. Hewett (2006) "A multi-theoretical model of knowledge transfer in organizations: determinants of knowledge contribution and knowledge reuse," Journal of Management Studies (43) 2, pp. 141-173.

Williamson, I. O., D. P. Lepak, and J. King (2003) "The effect of company recruitment web site orientation on individuals' perceptions of organizational attractiveness," Journal of Vocational Behavior (63) 2, pp. 242-263.

Xu, Y. C., B. C. Y. Tan, and L. Yang (2006) "Who will you ask? An empirical study of interpersonal task information seeking," Journal of the American Society for Information Science and Technology (57) 12, pp. 1666-1677.

Zandvliet, D. B. and L. M. Straker (2001) "Physical and psychosocial aspects of the learning environment in information technology rich classrooms," Ergonomics (44) 9, pp. 838-857.

Zimmer, J. C. and R. M. Henry. (2007) Antecedents to relational and nonrelational source use: an explorary investigation. the 40th Hawaii International Conference on System Sciences, Hawaii, 2007.

Zimmer, J. C., R. M. Henry, and B. S. Butler (2007-2008) "Determinants of the use of relational and nonrelational information sources," Journal of Management Information Systems (24) 3, pp. 297-311.

APPENDIX COMMON METHOD BIAS ANALYSIS

Appendix: Common Method Bias Analysis					
Construct	Items	Substantive factor		Method factor	
		Loading (R1)	R12	Loading (R2)	R22
Knowledge sourcing from KMS	KMS1	** 0.842	0.709	0.083	0.007
	KMS2	** 0.948	0.898	-0.089	0.008
Knowledge sourcing from documents	DOC1	** 0.884	0.781	0.029	0.001
	DOC2	** 0.882	0.777	-0.028	0.001
Knowledge sourcing from other individuals	OTI1	** 0.872	0.760	-0.039	0.002
	OTI3	** 0.838	0.702	0.041	0.002
Perceived usefulness of knowledge repositories	PU1	** 1.038	1.077	-0.164	0.027
	PU3	** 1.007	1.015	-0.074	0.005
	PU4	** 0.991	0.982	-0.027	0.001
	PU5	** 0.972	0.945	-0.022	0.000
	PU6	** 0.675	0.455	** 0.281	0.079
Perceived ease of use on knowledge repositories	EOU1	** 1.028	1.056	*-0.202	0.041
	EOU2	** 0.646	0.418	* 0.230	0.053
	EOU3	** 0.770	0.592	0.053	0.003
	EOU4	** 0.624	0.389	0.188	0.035
	EOU5	** 1.040	1.082	*-0.183	0.034
	EOU6	** 0.985	0.971	-0.067	0.004
Intellectual demand	ITD1	** 0.865	0.749	-0.034	0.001
	ITD3	** 0.851	0.725	-0.062	0.004
	ITD4	** 0.823	0.677	0.094	0.009
Learning orientation	LOR1	** 0.859	0.739	0.039	0.002
	LOR2	** 0.883	0.780	-0.048	0.002
	LOR3	** 0.860	0.739	0.008	0.000
Collaborative culture	CLC1	** 1.005	1.009	*-0.203	0.041
	CLC2	** 0.955	0.911	-0.158	0.025
	CLC3	** 0.936	0.876	-0.061	0.004
	CLC4	** 0.805	0.649	0.033	0.001
	CLC5	** 0.584	0.341	0.190	0.036
	CLC6	** 0.614	0.377	* 0.240	0.058
Time pressure	TPR1	** 0.862	0.742	* 0.145	0.021
	TPR4	** 0.752	0.565	-0.116	0.013
	TPR5	** 0.861	0.741	-0.015	0.000
Risk aversion	RSA1	** 0.907	0.822	** 0.126	0.016
	RSA3	** 0.886	0.784	**-0.124	0.015
Average		0.863	0.760	0.002	0.016
Note: * p < .05, ** p <.01; PLS bootstrap with 200 resamples					

ABOUT THE AUTHORS

Minnseok Choi received his MS in Industrial Engineering from Korea Advanced Institute of Science and Technology (KAIST) in 2001, and received his PhD in Management Engineering from the same university in 2012. He is conducting his research in the Electronics and Telecommunications Research Institute (ETRI) since 2001. His current research interest focuses on KMS, online collaboration, community-based innovation, open innovation, governing common goods, and scientific collaboration. His work has been presented in primary conferences, and currently published or submitted in a few journals in Management Information Systems (MIS) discipline.

Alexandra Durcikova is an Assistant Professor in the Price College of Business at the University of Oklahoma. She has two research streams. The first stream focuses on the adoption of Electronic Knowledge Repositories (EKR) by individuals in organizational settings; specifically, antecedents to EKR usage, characteristics of EKR, and consequences of EKR usage on work outcomes (e.g., innovation and knowledge reuse) and knowledge sharing and knowledge reuse. The second stream focuses on end-user security behavior; specifically, the goal is to develop a deeper understanding of how different types of technical controls (single sign-on vs. multiple sign-on and single vs. dual authentication) and educational controls (training vs. no training and number of trainings to enforce compliance vs. security cues) influence employees' compliance with security policies. Alexandra relies primarily on survey methods and experiments. Her work appeared in Information Systems Research (*ISR)*, Journal of Management Information Systems (*JMIS)*, Communications of the Association for Computing Machinery *(CACM)*, International Journal of Human-Computer Studies *(IJHCS)*, and International Journal of Knowledge Managemen (*IJKM)*.

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