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Evaluation of Electronic Knowledge Repositories

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Abstract

Knowledge is recognized as a vital asset in organizations. A large number of organizations are implementing knowledge management systems (KMS) in order to leverage their knowledge resources, a common form of which are electronic knowledge repositories (EKR). Since EKR implementation is costly, management needs to be aware of the factors that will make EKR more usable in order to reap benefit from its KM investment. This study formulates and tests theoretical models relating potential antecedent factors to the usability of EKR from the perspectives of both knowledge contributors and seekers. The findings of this study show that robustness, monitoring, and knowledge organization are positively related to EKR usability for knowledge contributors. For knowledge seekers, robustness, content, and knowledge organization significantly impact EKR usability. This study has implications for both knowledge management practitioners and researchers.

Keywords: Electronic knowledge repository, usability, knowledge contributor, knowledge seeker.

1. Introduction

The importance of knowledge management (KM) is being realized by a large number of organizations. A firm's competency is increasingly seen as being rooted in the skills and knowledge of its employees (Gray 2001). Most large consulting firms have built comprehensive systems for capturing and transferring knowledge to consultants so they can garner projects and deliver clients solutions built on best practices (O'Dell and Grayson 1998). Firms such as Siemens, Chevron Texaco, and Dow Chemical have benefited in terms of increased revenue and improved customer satisfaction from their introduction of KM initiatives (Vestal 2002).

KM is defined as a systemic and organizationally specified process for acquiring, organizing and communicating knowledge of employees so that other employees may make use of it to be more effective and productive in their work (Alavi and Leidner 1999). Knowledge management systems (KMS) are IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application (Alavi and Leidner 2001). The most common form of KMS is the electronic knowledge repository (EKR) (Davenport and Prusak 2000). EKR are intended to facilitate sharing,

integration, and reusing of knowledge in the organization and are considered key to organizational learning (Stein and Zwass 1995).

The value of EKR is derived from its use by both knowledge contributors and knowledge seekers. However, getting people to share knowledge both face to face and through KMS like EKR is a major challenge in KM (KPMG 2000). Usability studies of KMS if well designed can provide a good evaluation of system use, user satisfaction, and net benefits (Kankanhalli and Tan 2004), which are important aspects of success of these systems (Jennex and Olfman 2003). However, there is a lack of research on the usability of KMS and few papers describe the antecedents of the usability or usage. Further, identifying appropriate measures for the usability of these systems is important because what is not measured is often difficult to manage (Van Buren 1999). With such motivation in mind, this study attempts to identify the antecedents and appropriate measures of EKR usability for both knowledge contributors and seekers. The findings can serve to inform EKR design and KM practice.

2. Conceptual Background

The conceptual bases to identify the attributes of EKR usability for both contributors and seekers is mainly derived from the human computer interaction (HCI), information systems (IS), and KMS success fields.

2.1 Definition of Usability

The international standard, ISO 9241-11 (Karat 1997), provides guidance on usability and defines it as the extent to which a product or system can be used by specified users to achieve their goals with effectiveness, efficiency and satisfaction in a specified context of use. This is a very fundamental and high-level conceptual definition from which most other definitions of usability originate (Agarwal and Venkatesh 2002). Dix et al. (1998) further described the subconcepts of usability. Effectiveness measures the accuracy and completeness with which users can achieve their goals. Efficiency is defined as the resources expended in relation to the accuracy and completeness of goals achieved. User satisfaction refers to the comfort and acceptability of the work system to its users and other people affected by its use. Effectiveness, efficiency and user satisfaction are the basic outcome measures for an usable system. Factors that may determine these outcomes are identified from the literature on IS and KMS success.

2.2 IS and KMS Success

DeLone and McLean's (1992) model of IS success has received interest and widespread popularity amongst researchers. By organizing and integrating previous literature the authors built a taxonomy which consisted of six dimensions of IS success. The dimensions are system quality, information quality, use, user satisfaction, individual impact, and organizational impact. In a ten-year update, DeLone and McLean revised and refined the success model (DeLone and McLean 2003). In the new model, use was expanded by including intent to use. Also, individual impact and organizational impact were grouped into a single category called net benefits.

Jennex and Olfman (2003) extended the updated DeLone and McLean success model to measure KMS success. The adapted model for the KMS context is shown in Figure 1. In this model, information quality was re-conceptualized as knowledge quality. For the outcome measures, the authors argued that perceived benefits should be added to the intent to use construct. Since the use of KMS is usually voluntary these two concepts should be highly correlated. Use and user satisfaction were combined into one construct since they have strong correlation. The items for measuring net benefits mainly assessed improvements in effectiveness and efficiency of individual performance. Based on this model, knowledge quality and system quality appear as antecedents of usability outcomes which include use, user satisfaction, efficiency, and effectiveness.

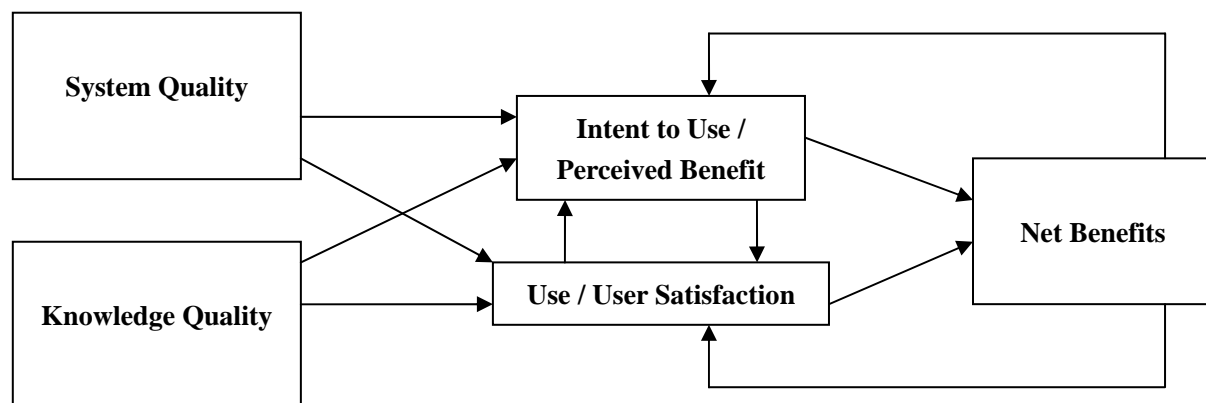


Figure 1: KMS Success Model (Source: Jennex and Olfman 2003)

3. Model and Hypotheses

Based on the Jennex and Olfman KMS success model we formulated models of EKR usability for contributors and seekers with system quality and knowledge quality as antecedents (see Figure 2¹). The dependant variable consists of measures of effectiveness, efficiency, and satisfaction from the original definition of usability as well as use measures as per the Jennex and Olfman model. Knowledge quality consists of both content aspects as well as the way in which content is organized (Huang 1999; Jennex and Olfman 2003) for knowledge seekers. For contributors, knowledge organization is the relevant aspect of knowledge quality since contributors are the ones providing content to EKR. System quality includes concepts of ease of use, flexibility, robustness (Dix et al. 1998), and monitoring (Baek and Liebowitz 1999).

3.1 System Quality

System quality refers to the desired characteristics of EKR which consist of ease of use, flexibility, robustness, and monitoring capability. Ease of use is considered an important antecedent of usability since it is likely to influence the usage and acceptance of the system (Belardo et al. 1982; Davis 1989; Keeker 1997). Even if users believe that the system is useful but simultaneously believe that the system is too hard to use, the benefits of usage may be outweighed by the effort of using the system. This suggests the following hypotheses,

¹ Although the constructs are defined commonly for contributors and seekers, the items for each are different.

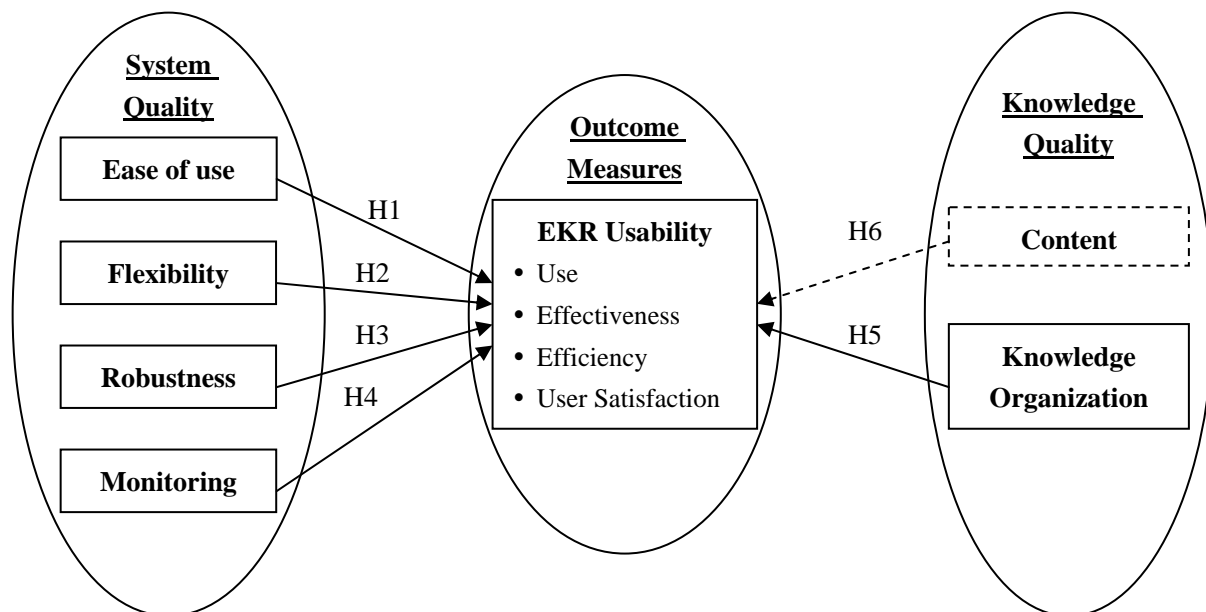


Figure 2: Research Model for EKR Usability

(Note: Content is relevant for seekers only)

H1c: Ease of use is positively related to EKR usability for knowledge contributors

H1s: Ease of use is positively related to EKR usability for knowledge seekers

Flexibility is considered as an important system capability (Bailey and Pearson 1983; Mahmood 1987). It refers to the multiplicity of ways the user and system interact with each other (Dix et al., 1998). System flexibility indicates how well the system can adapt satisfactorily to user requirements (Lecerof and Paternò 1998) and therefore is likely to affect usability. Thus, we hypothesize:

H2c: Flexibility is positively related to EKR usability for knowledge contributors

H2s: Flexibility is positively related to EKR usability for knowledge seekers

System robustness includes response time and reliability (Dix et al. 1998). Download delay and response time are considered as important antecedents of web-based system usability (Keeker 1997; Nielsen 2000; Palmer 2002). These antecedents are likely to be relevant for EKR which typically have a web-like interface as well. System reliability and up time have also been found to influence usability of IS (Belardo et al. 1982; Srinivasan 1985). More robust EKR are likely to have greater usability.

H3c: Robustness is positively related to EKR usability for knowledge contributors

H3s: Robustness is positively related to EKR usability for knowledge seekers

Previous studies (Baek and Liebowitz 1999) have noted the need for tracking knowledge contribution and seeking activities in order to provide fair assessment and incentives for these activities. At the system level, the EKR must have a good monitoring capability to track user behavior for both contributors and seekers and reward them accordingly. The monitoring capability is likely to influence usability of EKR.

H4c: Monitoring capability is positively related to EKR usability for knowledge contributors

H4s: Monitoring capability is positively related to EKR usability for knowledge seekers

3.2 Knowledge Quality

Knowledge quality refers to the desired characteristics of the EKR knowledge in terms of content (for knowledge seekers) and organization (for both contributors and seekers). Knowledge organization is defined as the sequencing of pages, well organized layout, and consistency of navigation protocols (Palmer 2002). Researchers suggest that organization and navigation are important determinants of usability (Nielsen 2000).

H5c: Knowledge organization is positively related to EKR usability for knowledge contributors

H5s: Knowledge organization is positively related to EKR usability for knowledge seekers

Content is one of the most important antecedents of website usability (Keeker 1997; Palmer 2002; Agarwal and Venkatesh 2002). Content quality, accuracy, and reliability of the knowledge in EKR have been found critical to usage of EKR by knowledge seekers (Kankanhalli et al. 2001). Therefore we hypothesize

H6: EKR content is positively related to EKR usability for knowledge seekers.

4. Research Methodology

The survey research method was chosen in this study for greater generalizability. Constructs were operationalized through literature review and subjected to conceptual validation (Churchill 1979).

4.1 Operationalization of Constructs

The survey items were generated from review of the relevant HCI, IS, and KM literature. The review helped to discover the dimensions and items of existing constructs and derive the reasoning behind the self-developed items. Since this study is exploratory, most of the items in the survey are adopted from non-EKR context or newly developed. A thorough conceptual validation exercise was conducted based on Moore and Benbasat's (1991) procedure. Except for monitoring and knowledge organization, remaining constructs appear to be formative (Chin 1998a) and consist of several dimensions. All 44 items for contributors and 49 items for seekers were structured on a rating scale of seven points. The operationalization of constructs is summarized in Table 1.

4.2 Survey Administration

The survey was administered to part-time (evening) postgraduate students at the computing department of a large university in Singapore. The 98 participants were working in knowledge intensive jobs, mainly in the computer and education industries. The EKR under study was a part of the department digital library. The repository contained reports, working papers, theses, and other publications. All participants had experience seeking from the EKR while 47 of them had contributed to the EKR. These 47 individuals were asked to complete the contributor questionnaire while the remaining participants filled out the seeker

questionnaire. The majority of respondents were male (63.6%), aged between 21 and 29 years old (81.8%), and had less than six years working experience (80.8%). Most of the respondents held Bachelor degrees (72.7%) with the remaining having Masters degrees.

Constructs	Contributor Model	Seeker Model	Item Source
Ease of Use (EOU)	<ul style="list-style-type: none"> Ease of access (EOU1, 2) Ease of control (EOU3, 4) Ease of learning (EOU5, 6) Ease of understanding (EOU7, 8) 	<ul style="list-style-type: none"> Ease of access (EOU1, 2) Ease of control (EOU3) Ease of learning (EOU4, 5) Ease of understanding (EOU6, 7) 	<ul style="list-style-type: none"> El Sawy et al. (1986) Davis (1989) Dix et al. (1998) Self-developed
Flexibility (FLE)	<ul style="list-style-type: none"> Functionality (FLE1) Media use (FLE2, 3) Multi-tasking (FLE4, 5) Collaboration (FLE6, 7) Customization (FLE8, 9) 	<ul style="list-style-type: none"> Functionality (FLE1, 2) Media use (FLE3, 4) Multi-tasking (FLE5, 6) Substitutivity (FLE7, 8) Customization (FLE9*, 10*) 	<ul style="list-style-type: none"> Palmer (2002) Dix et al. (1998) Self-developed
Robustness (ROB)	<ul style="list-style-type: none"> Feedback mechanism (ROB1, 2) Responsiveness (ROB3, 4) Recoverability (ROB5, 6) System up time (ROB7, 8) 	<ul style="list-style-type: none"> Feedback mechanism (ROB1, 2) Responsiveness (ROB3, 4) Recoverability (ROB5, 6) System up time (ROB7, 8) 	<ul style="list-style-type: none"> Palmer (2002) Srinivasan (1985) Belardo et al. (1982) Self-developed
Monitoring (MON)	<ul style="list-style-type: none"> Integrity and security (MON1, 2) Tracking (MON3, 4) 	<ul style="list-style-type: none"> Tracking (MON1, 2) 	Self-developed based on Baek et al. (1999)
Content (CON)	/	<ul style="list-style-type: none"> Depth and breadth (CON1) Timeliness (CON2, 3) Accuracy (CON4, 5) Reliability (CON6) Clarity and Readability (CON7) 	<ul style="list-style-type: none"> Kankanhalli et al. (2001) Agarwal and Venkatesh (2002)
Knowledge Organization (KOR)	<ul style="list-style-type: none"> Format of input (KOR1) Knowledge indexing (KOR2) 	<ul style="list-style-type: none"> Presentation and formatting (KOR1 – 4) 	<ul style="list-style-type: none"> Palmer (2002) Stein et al. (1995) Self-developed
EKR Usability	<ul style="list-style-type: none"> Use (USE1 – 4) Effectiveness (EFE1 – 3) Efficiency (EFI1, 2) User satisfaction (USA1 – 4) 	<ul style="list-style-type: none"> Use (USE1 – 3) Effectiveness (EFE1 – 4) Efficiency (EFI1, 2) User satisfaction (USA1 – 4) 	<ul style="list-style-type: none"> DeLone and McLean (1992) Dix et al. (1998) Davis (1989)

Table 1: Operationalization of Constructs

(* item deleted after validity test)

5. Data Analysis and Results

Partial Least Squares (PLS), a structural equation modeling technique that simultaneously tests measurement and structural models, was used for data analysis. PLS is well suited for early stages of theory development with small sample sizes such as in our study (Barclay et al. 1995). Another reason to use PLS is because it can handle the formative constructs in our

models (Chin 1998b) as opposed to covariance based structural analysis packages such as LISREL. PLS Graph 2.91 was used for the validation and testing of the research models.

5.1 Measurement Model Evaluation

The strength of a measurement model can be demonstrated through convergent and discriminant validity (Hair et al. 1995). Convergent validity is the extent to which two or more items measuring the same construct agree, while discriminant validity is the degree to which items of a construct differ from those of other constructs (Cook and Campbell 1979). While testing for convergent validity we distinguish between reflective (MON and KOR in the seeker model) and formative constructs (all remaining constructs in the two models).

Monitoring (MON) and Knowledge Organization (KOR) in the knowledge seeker's measurement model are reflective constructs since they are unidimensional and all the items should reflect the same latent variables. The convergent validity of reflective indicators can be measured in three ways: (1) item reliability, which has a minimum required loading of 0.707 between the item and the intended construct (Chin 1998a), (2) Cronbach's Alpha and composite reliability of construct, for which values of 0.707 or above indicate adequate internal consistency (Thompson et al. 1994), and (3) average variance extracted (AVE) by construct, for which the minimum acceptable value is 0.5 (Fornell et al. 1981). The reflective constructs in this study appear to pass all the tests for convergent validity (refer to Table 2).

Construct and Items	Item Reliability	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Monitoring		0.85	0.93	0.86
MON1	0.91			
MON2	0.95			
Knowledge Organization		0.83	0.89	0.67
KOR1	0.86			
KOR2	0.82			
KOR4	0.85			
KOR4	0.75			

Table 2: Convergent Validity of Reflective Constructs

For formative measures, although internal consistency and reliability are inappropriate, the item weights can be examined to identify the relevance of the items to the research model (Wixom and Watson 2001). Item weights can be interpreted as a beta coefficient in a standard regression and the general approach is to compare the weights of different indicators rather than interpreting them in a factor loading sense (Sambamurthy and Chin 1994). Table 3 shows the item weights for the contributor constructs and Table 4 for the seeker formative construct items.

We can see from Table 3 that for knowledge contributors, EOU6, FLE4, ROB4, ROB7, MON1, MON3, USE3, and EFI2 contribute the most to their respective constructs. This suggests that knowledge contributors mainly value ease of learning, multi-tasking capability,

responsiveness, reliability, tracking capability, and integrity of EKR. In the outcome measures, use and efficiency are the main concerns for knowledge contributors. For knowledge seekers, Table 4 shows that EOU1, EOU3, FLE1, ROB4, CON5, and USA2 are the main contributors to their respective constructs. This suggests that knowledge seekers are more concerned about the ease of access, ease of control, functionality, and responsiveness of EKR. They also care about the accuracy of the knowledge they obtain. User satisfaction is a key indicator in the outcome measures for seekers.

Constructs and Items	Item Weight	Constructs and Items	Item Weight
Ease of Use		Flexibility	
EOU1	0.37	FLE1	0.25
EOU2	-0.27*	FLE2	0.18
EOU3	0.23**	FLE3	-0.21
EOU4	0.22**	FLE4	0.61***
EOU5	-0.25**	FLE5	0.53**
EOU6	0.41***	FLE6	0.37
EOU7	0.83**	FLE7	-0.43*
EOU8	-0.46**	FLE8	0.29
Robustness		FLE9	-0.55
ROB1	0.06	EKR Usability	
ROB2	0.15	USE1	-0.13**
ROB3	0.39**	USE2	0.06**
ROB4	-0.21***	USE3	-0.32***
ROB5	0.07*	USE4	0.27
ROB6	0.22	EFE1	0.36
ROB7	0.23***	EFE2	-0.37
ROB8	0.44*	EFE3	0.32
Monitoring		EFI1	-0.23
MON1	0.86***	EFI2	0.92***
MON2	-0.35**	USA1	0.40**
MON3	0.51***	USA2	-0.34*
MON4	0.05**	USA3	0.17
Knowledge Organization		USA4	-0.07*
KOR1	-0.57**	* Indicates item is significant at $p < 0.05$; ** $p < 0.025$; *** $p < 0.0005$	
KOR2	-0.59		

Table 3: Item Weighting for Knowledge Contributor Constructs

Discriminant validity can be tested by observing the question loadings in a factor analysis of the constructs. This test requires that each question load more highly to the intended construct than other constructs (Jarvenpaa 1989). Factor analysis with principal component analysis and varimax rotation in SPSS 11.05 was used to examine the question loadings. From Table 5 we can see that all items for the two reflective constructs loaded higher to the intended constructs and passed the discriminant validity test.

Constructs and Items	Item Weight	Constructs and Items	Item Weight
Ease of Use		Robustness	
EOU1	0.58**	ROB1	0.27
EOU2	-0.24	ROB2	0.05
EOU3	0.53**	ROB3	0.35
EOU4	0.23	ROB4	0.40**
EOU5	-0.26	ROB5	0.03
EOU6	0.37	ROB6	-0.20
EOU7	-0.10	ROB7	0.38*
Flexibility		ROB8	0.01
FLE1	0.48**	EKR Usability	
FLE2	0.32	USE1	0.35*
FLE3	0.17	USE2	-0.03
FLE4	-0.21	USE3	-0.04
FLE5	0.11	EFE1	0.27*
FLE6	0.04	EFE2	-0.01
FLE7	0.07	EFE3	-0.20
FLE8	0.39*	EFE4	-0.14
Content		EFI1	0.12
CON1	0.30*	EFI2	0.02
CON2	0.31*	USA1	0.05
CON3	0.24	USA2	0.49**
CON4	-0.25	USA3	-0.07
CON5	0.43**	USA4	0.39*
CON6	-0.10	* Indicates item is significant at $p < 0.05$; ** $p < 0.025$; *** $p < 0.0005$	
CON7	0.31*		

Table 4: Item Weighting for Knowledge Seeker Formative Constructs

Constructs and Items	Component	
	KOR	MON
Monitoring		
MON1	0.01	0.93
MON2	0.20	0.91
Knowledge Organization		
KOR1	0.82	0.18
KOR2	0.85	-0.05
KOR3	0.79	0.03
KOR4	0.78	0.37

Table 5: Factor Analysis Results for Reflective Constructs

5.2 Structural Model Evaluation

After assessing the validity of the measurement models, the structural models were evaluated for their predictive validity and results of hypotheses testing. The explanatory power and

predictive validity of a structural model can be assessed by looking at the R^2 value of the final dependant variable (Falk and Miller 1992). In this study, the R^2 value of EKR usability for the contributor model is 0.82 and for the seeker model is 0.85. This suggests that the models have significantly high predictive validity.

After computing the path coefficient estimates in the two models, PLS used the Jack-knife resampling technique to obtain the T-statistic for each path. To determine whether a hypothesis is supported, the sign of the path coefficient needs to be examined as well as the significance of the path coefficients (Keil et al. 2000). Tables 6 and 7 present the results of hypotheses testing for the two models.

Hypothesis	Path Coefficient	T-Value	P-Value	Outcome
H1c: Ease of use to Usability	-0.09	-1.52	NS	Not Supported
H2c: Flexibility to Usability	0.30	1.28	NS	Not Supported
H3c: Robustness to Usability	0.46	3.05	< 0.005	Supported
H4c: Monitoring to Usability	0.45	3.40	< 0.005	Supported
H5c: Knowledge organization to Usability	0.16	3.15	< 0.005	Supported

Table 6: Results for Contributor Model Hypotheses Testing

Hypothesis	Path Coefficient	T-Value	P-Value	Outcome
H1s: Ease of use to Usability	0.11	0.15	NS	Not Supported
H2s: Flexibility to Usability	-0.03	-0.86	NS	Not Supported
H3s: Robustness to Usability	0.40	2.00	< 0.05	Supported
H4s: Monitoring to Usability	-0.07	-0.56	NS	Not Supported
H5s: Knowledge organization to Usability	0.39	2.24	< 0.025	Supported
H6: Content to Usability	0.20	2.37	< 0.005	Supported

Table 7: Result for Seeker Model Hypotheses Testing

The results presented in Tables 6 and 7 show that robustness and knowledge organization are positively related to EKR usability in both contributor and seeker models. Monitoring is positively related to usability for knowledge contributors but not for seekers. Content is positively related to usability for knowledge seekers. Ease of use and flexibility are not significantly related to EKR usability for both models. Respondent demographics did not appear to affect the results of our study.

6. Discussion and Implications

This study has developed and tested models for explaining EKR usability from both knowledge contributor and seeker perspectives. It has identified significant determinants of usability for both types of users.

6.1 Robustness

Our findings indicate that system robustness is positively related to EKR usability for both knowledge contributors and seekers. Contributors and seekers place value on the system self-improvement ability (by incorporating user feedback), system responsiveness,

recoverability, and system reliability. In particular, the high item weights on responsiveness and system reliability suggest that users want a fast and highly reliable system with satisfactory system up time. They would like to refer to the system without worrying about break downs when there is a need for knowledge searching or sharing. This finding also implies that focused functionality is important, especially when the additional features may affect the speed or reliability of the system.

6.2 Knowledge Organization

The hypotheses on the positive relation between knowledge organization and EKR usability is supported in both contributor and seeker models. This finding shows that the indexing and formatting of the knowledge is important to knowledge contributors and seekers. For knowledge contributors, proper indexing could reduce the codification effort to input knowledge. For knowledge seekers, proper indexing of knowledge, clear formatting of the displaying page and the logical sequence of knowledge presentation could facilitate knowledge seeking. Therefore creating the appropriate knowledge taxonomy as well as classification and indexing schemes is important for EKR usability.

6.3 Monitoring

The hypothesis regarding the monitoring capability of the EKR system is supported in the contributor model but not in the seeker model. For knowledge contributors, the security and integrity of the knowledge they have contributed are important. They do not want any loss or distortion of the knowledge they have shared. As part of the monitoring capability, an effective tracking system is necessary to ensure fair reward of knowledge contributors. Our findings agree with previous literature which suggests that fairness provides motivation for contributors to share their knowledge (Baek and Liebowitz 1999). However knowledge seekers normally do not have the above mentioned concerns and monitoring capability of the EKR does not seem as relevant to them. Therefore, to encourage contributor usage, an organizational policy to ensure fair credit for sharing is necessary.

6.4 Content

The quality of the knowledge content of the EKR is very important to knowledge seekers. Our findings show that the depth of knowledge, timeliness, accuracy, reliability and clarity of the knowledge content are related to the perceived EKR usability by knowledge seekers. Ultimately, the knowledge seekers are seeking for content. The quality of content is a necessary factor to determine whether knowledge seekers can achieve their query goals. This is similar to the website case, where users also rated content as the most important criterion for usability (Agarwal and Venkatesh 2002).

6.5 Ease of Use

The hypotheses on the relationship between ease of use and EKR usability are not supported in both knowledge contributor and seeker models. A possible reason for this could be that most of the users of EKR who took part in this study, whether contributors or seekers, are knowledge workers with high proficiency in IT. Therefore they may not find the system

difficult to use. Davis (1989) noted that self-efficacy is related to perceived ease of use. In our study, since the subjects are mainly IT professionals, perceived ease of use may not be a concern towards usability.

6.6 Flexibility

Our findings suggest that the flexibility of EKR does not affect EKR usability for both contributor and seeker models. This could be explained by the fact that most of the knowledge contributors and seekers usually use the EKR with specific goals of knowledge contribution or seeking. Since their usage is very goal-specific, as long as they can achieve their purpose of contributing or seeking, it does not matter to them whether the system is equipped with other fancy functions, customizability, multiple ways of working, or multiple media types. Although features like customization or media use are important to websites (Agarwal and Venkatesh 2002; Palmer 2002), this may not be the case in a more goal-specific system such as EKR. This finding implies that organizations should focus on the core functions of EKR instead of the additional features.

7. Conclusion

This study develops and empirically tests models to measure EKR usability from the contributor and seeker perspectives. Since there are very few prior studies on the usability of KMS, this work is done in the hope of closing this gap. The survey instruments have been rigorously developed and validated. Among a number of potential antecedents, the results indicate which of the antecedents are significant in determining EKR usability. Since the sample size of this study is small with a majority of participants from the IT industry, future studies can test the models on larger samples of knowledge workers from a variety of industries. Nevertheless, the models provide researchers with a basis for future studies on KMS usage. The findings of this study also provide suggestions to practitioners on how to measure and improve usability of EKR in organizations.

References

- Agarwal, R., and Venkatesh, V. "Assessing a Firm's Web Presence: A Heuristic Evaluation Procedure for the Measurement Usability," *Information Systems Research* (13:2), 2002, pp. 168-186.
- Alavi, M., and Leidner, D.E. "Knowledge Management Systems: Issues, Challenges, and Benefits," *Communications of the Association for Information Systems* (1:7), 1999.
- Alavi, M., and Leidner, D.E. "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations of Research Issues," *MIS Quarterly* (25:1), 2001, pp. 107-136.
- Baek, S., and Liebowitz, J. "Designing a Web-based Knowledge Repository in a Virtual Team and Exploring its Usefulness," *Proceeding of Americas Conference on Information Systems*, Milwaukee, WI, 1999, pp. 453-455.
- Bailey, J.E., and Pearson, S.W. "Development of a Tool for Measuring and Analyzing Computer User Satisfaction," *Management Science* (29:5), 1983, pp. 530-545.
- Barclay, D., Higgins, C., and Thompson, R. "The Partial Least Square Approach to Causal Modeling: Personal Computer Adoption and Use as an Illustration," *Technology Studies*

- (2:2), 1995, 398-422.
- Belardo, S., Karwan, K.R., and Wallace, W.A. "DSS Component Design through Field Experimentation: An Application to Emergency Management," *Proceedings of the Third International Conference on Information Systems*, Ann Arbor, MI, 1982, pp. 93-108.
- Chin, W.W. "Issues and Opinion on Structural Equation Modeling," *MIS Quarterly* (22:1), 1998a, pp. vii – xvi. <http://www.misq.org/archivist/vol/no22/issue1/vol22n1comntry.html>
- Chin, W.W. "The Partial Least Squares Approach to Structural Equation Modeling," in *Modern Methods for Business Research*, G.A. Marcoulides (ed.), Lawrence Erlbaum Associates, Mahwah, NJ, 1998b, pp. 295-336.
- Churchill, G.A. "A Paradigm for Developing Better Measures of Marketing Constructs," *Journal of Marketing Research* (16:1), 1979, pp. 64-73.
- Cook, T. D., and Campbell, D.T., *Quasi-Experimentation: Design & Analysis Issues for Field Settings*, Houghton Mifflin, Boston, MA, 1979.
- Davenport, T.H., and Prusak, L. *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press, Boston, MA, 2000.
- Davis, F.D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3), 1989, pp. 318-341.
- DeLone, W.H., and McLean, E.R. "Information Systems Success: The Quest for the Dependent Variable," *Information Systems Research* (3:1), 1992, pp. 60-95.
- DeLone, W.H., and McLean, E.R. "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update," *Journal of Management Information Systems* (19:4), 2003, pp. 9-30.
- Dix, A.J., Finlay, J.E., Abowd, G.D., and Beale, R. *Human-Computer Interaction*, 2nd edition, Prentice Hall, Hertfordshire, 1998.
- El Sawy, O.A., Gomes, G.M., and Gonzalez, M.V. "Preserving Institutional Memory: The Management of History as an Organizational Resource," *Academy of Management Best Paper Proceedings*, 1986, pp. 118-122.
- Falk, R.F., and Miller, N.B. *A Primer for Soft Modeling*, The University of Akron Press, Akron, OH, 1992.
- Fornell, C., and Larcker, D.F. "Evaluating Structural Equation Models with Unobservable and Measurement Error," *Journal of Marketing Research* (18:1), 1981, pp. 39-50.
- Gray, P.H. "A Problem-Solving Perspective on Knowledge Management Practices," *Decision Support Systems* (31:1), 2001, pp. 87-102.
- Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C. *Multivariate Data Analysis with Readings*, 4th Edition, Prentice Hall, Englewood Cliffs, NJ, 1995.
- Huang, K. T., Lee, Y. W., and Wang, R. Y., *Quality Information and Knowledge*, Prentice-Hall, NJ, 1999.
- Jarvenpaa, S.L. "The Effects of Task Demands and Graphical Format on Information Processing Strategies," *Management Science* (35:3), 1989, pp. 285-303.
- Jennex, M.E., and Olfman, L. "A Knowledge Management Success Model: An Extension of DeLone and McLean's IS Success Model," *Proceeding of Ninth Americas Conference on Information Systems*, Tampa, FL, 2003.
- Kankanhalli, A., and Tan, C.Y. "A Review of Metrics for Knowledge Management System and Knowledge Management Initiatives," *Proceedings of Hawaii International*

- Conference on Systems Sciences*, Big Island, 2004.
- Kankanhalli, A., Tan, C.Y., and Wei, K.K. "Seeking Knowledge in Electronic Knowledge Repositories: An Exploratory Study," *Proceeding of Twenty-Second International Conference on Information Systems*, New Orleans, LA, 2001.
- Karat, J. "Evolving the Scope of User-Centered Design," *Communications of the ACM* (40:7), 1997, pp. 33-38.
- Keeker, K. "Improving Web Site Usability and Appeal: Guidelines Compiled by MSN Usability Research," 1997. <http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnsiteplan/html/IMPROVINGSITEUSA.asp>
- Keil, M., Tan, B.C.Y., Wei, K.K., Saarinen, T., Tuunainen, V., and Waasennar, A. "A Cross-Cultural Study on Escalation of Commitment Behavior in Software Projects," *MIS Quarterly* (24:2), 2000, pp. 299-325.
- KPMG, Knowledge Management Research Report 2000.
http://www.kpmg.nl/Docs/Knowledge_Advisory_Services/KPMG%20KM%20Research%20Report%202000.pdf
- Lecerof, A., and Paternò, F. "Automatic Support for Usability Evaluation," *IEEE Transactions on Software Engineering* (24:10), 1998, pp. 863-888.
- Mahmood, M.A. "System Development Methods – A Comparative Investigation," *MIS Quarterly*, (11:3), 1987, pp. 293-311.
- Moore, G.C. and Benbasat, I. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research* (2:3), 1991, pp. 192-222.
- Nielsen, J. *Designing Web Usability: The Practice of Simplicity*, New Riders Publishing, Indianapolis, IN, 2000.
- O'Dell, C., and Grayson, C.J. "If Only We Knew What We Know: Identification and Transfer of Internal Best Practices," *California Management Review* (40:3), 1998, pp. 154-174.
- Palmer, J.W. "Web Site Usability, Design, and Performance Metrics," *Information Systems Research* (13:2), 2002, pp. 151-167.
- Sambamurthy, V., and Chin, W.W. "The Effects of Group Attitudes toward Alternative GDSS Designs on the Decision-making Performance of Computer-Supported Groups," *Decision Sciences* (25:2), 1994, pp. 215-241.
- Srinivasan, A. "Alternative Measures of System Effectiveness: Associations and Implications," *MIS Quarterly* (9:3), 1985, pp. 243-253.
- Stein, E.W., and Zwass, V. "Actualizing Organizational Memory with Information Systems," *Information Systems Research* (6:2), 1995, pp. 85-117.
- Thompson, R.L., Higgins, C.A., and Howell, J.M. "Influence of Experience on Personal Computer Utilization: Testing a Conceptual Model," *Journal of Management Information Systems* (11:1), 1994, pp. 167-187.
- Van Buren, M.E. "A Yardstick for Knowledge Management," *Training & Development* (53:5), 1999, pp. 71-78.
- Vestal, W. "Measuring Knowledge Management," American Productivity & Quality Center Report, 2002. http://www.kmadvantage.com/docs/km_articles/Measuring_KM.pdf
- Wixom, B.H., and Watson, H.J. "An Empirical Investigation of the Factors Affecting Data Warehousing Success," *MIS Quarterly* (25:1), 2001, pp. 17-41.