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Knowledge as an Intellectual Property: The Effect of Knowledge Sharing and Encouragement by Others on Information Systems Use in the Workplace

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ABSTRACT

Organizations invest in Information Systems (IS) to help achieve strategic goals and to disseminate knowledge in order to enhance employee productivity. Most individuals consider knowledge as their intellectual property. However, sharing the knowledge about using IS and encouraging others to use IS has received limited attention in research. This study examined employees' knowledge sharing (collegial and technical knowledge), encouragement by others to share knowledge, and their role in predicting computer self-efficacy (CSE) and IS usage. This study included 256 participants from five different organizations. Web-based instrument was used based on prior measures from literature, and an expert panel review was done. We conducted a confirmatory data analysis using Structural Equation Modeling (SEM) with AMOS[®]. Our results indicate that encouragement by others does significantly impact knowledge sharing. We also found that while technical knowledge sharing had a significantly positive influence on CSE, collegial knowledge sharing had a negative influence on CSE.

Keywords

Knowledge as intellectual property, collegial knowledge sharing, computer self-efficacy, encouragement by others to share knowledge, information system usage in the workplace, social networking in knowledge sharing

INTRODUCTION

Organizations have been making considerable Information Systems (IS) investments, however, employees not always use all IS features, which prevent these organizations from reaching full potential of their investments (Saeed and Abdinnour-Helm, 2008). According to Sheng, Pearson, and Crosby (2003), IS usage has increased dramatically in business operations over the past two decades. Coelho and Vilares (2010) suggested that knowledge relates to valuing of organizational investments. As claimed by Hill-King (2007), intellectual property includes items of information and knowledge. According to Thatcher, Zimmer, Gundlach, and McKnight (2008), computer self-efficacy (CSE) has been documented to be the most significant construct that predicts an individual's use of IS. Compeau and Higgins (1995) defined CSE as one's belief in their capabilities to use IS in the accomplishment of a task. As defined by Hasan (2006), CSE studies primarily focused on the general and application levels of the construct. Although significant research has been done on IS use over the past three decades, other IS literature suggests that a very limited number of research studies have examined the antecedents of CSE and the role knowledge sharing has on such a critical construct (Legris, Ingham and Collette, 2003; Levy and Green, 2009). Thus, this study was designed to empirically validate the effects of knowledge sharing and encouragement by others in predicting CSE and use of IS in the workplace.

This study addressed the underlying issue that users consider their own knowledge as intellectual property and at some instances elect to reserve such knowledge rather than share it with their colleagues. Although, they're aware that sharing such knowledge can help other employees increase their productivity, which in turns undermines the organization's efforts to

achieve greater productivity. According to Thatcher et al. (2008), the human-assisted external CSE dimension focuses on one's ability to use IS which results from other individual support. Drawing on the findings of Thatcher et al. (2008), this study examined the effects of knowledge sharing and encouragement by others to predict CSE and IS use through the encouragement of one's experience with Enterprise Resource Planning (ERP) systems. In addition to assessing one's reference-group interaction, this study examined if there are any significance differences on knowledge sharing and encouragement by others based on employees' use of social networking sites.

The need for this work follows from the recommendation made by Bock et al. (2005), which noted that there is a need to extend research into users' actual knowledge-sharing behaviors. Furthermore, this study builds on previous research that examined CSE, knowledge sharing, and encouragement by others (Bock et al., 2005; Compeau and Higgins, 1995; Thatcher et al., 2008). However, these studies had limited research on the antecedents of CSE as noted in the meta-analysis studies conducted by Legris et al. (2003) as well as Levy and Green (2009). As such, this study attempted to fill in such gap by examining some key constructs that serve as antecedents of CSE. This study investigated the influence that knowledge sharing and encouragement by others has on individual's use of IS in applied ERP environments. For the purpose of this study, knowledge sharing refers to the willingness of individuals in an organization to share with others the knowledge they have acquired or created. The rest of this paper is arranged as follows: the next section presents the theoretical background on CSE and knowledge sharing. Then, the research model and hypothesis are outlined, followed by the analyses and results. The paper concludes with discussions about the limitations of the study, conclusion, implication of the study, and recommendations for future research.

THEORETICAL BACKGROUND

Prior IS literature on knowledge sharing has established that researchers have looked at knowledge sharing as a system of influences, resulting in outcomes such as performance and feedback impacting future knowledge sharing (Bock et al., 2005; Haas and Hansen, 2005; Tsai, 2005). Other IS literature has emphasized the positive outcome of knowledge-sharing policies and practices, including individual demonstrations of knowledge-sharing behavior and positive effects on task performance (Sabherwal and Becerra-Fernandez, 2005). According to Ford and Staples (2008), knowledge sharing is a behavior that is either an action or activity. Hsu and Wang (2008) further defined knowledge-sharing effectiveness as "employees' exhibition of knowledge sharing behaviors and positive impacts on task performance" (p. 49). Other researchers suggested that knowledge sharing is one of knowledge management cornerstone that improves productivity (Levy and Hazzan, 2009). Knowledge Management (KM) seeks to systematically improve that capacity. However, studies involving knowledge sharing are limited when it comes to the effects it has on CSE and IS use.

According to Hasan (2007), IS use remains a paramount issue in IS research and practice. According to Deng et al. (2004), encouragement by others is one of the determinants of CSE. Encouragement by others exerts influence on self-efficacy and outcome expectations (Lam and Lee, 2005). It is also, considered to have a positive influence on CSE (Compeau and Higgins, 1995). Other researchers found that encouragement by others to use IS may increase one's intentions to use IS (Thompson et al., 2006). However, Hsu and Wang (2008) found evidence that the influence of top-management values on knowledge-sharing effectiveness is mediated through knowledge-sharing policies and practices. Additionally, Endres et al. (2007) suggested that encouragement by others should have a positive influence on knowledge sharing under certain conditions. However, it appears that previous literature has not fully identified how encouragement by others to share knowledge affects CSE and the use of IS. Two critical types of knowledge sharing were previously observed: collegial knowledge sharing and technical knowledge sharing. For the purpose of this study, collegial knowledge sharing refers to an individual's reference group sharing organizationally relevant information, suggestions, and expertise with one another (Bartol and Srivastava, 2002). Technical knowledge sharing refers to an individual's know-how in a specific IS related situation, such as a help desk, technical support, or information center (Nonaka, 1994).

IS scholars have long studied how CSE affects the use of IS or intention to use an IS (Hasan and Ali, 2006; Levy and Green, 2009; Thompson et al., 2006). Hsu and Chiu (2004) found that CSE has positive effects on IS usage, attitudes, and intentions. However, a very limited number of research studies have examined the antecedents of CSE (Legris et al., 2003; Levy and Green, 2009). These prior studies have emphasized CSE itself, as opposed to investigating backwards for the CSE antecedents. Therefore, the key aim of this study was to extended the existing body of knowledge by exploring how knowledge sharing and encouragement by others to share knowledge affect CSE and the use of IS in the workplace. The conceptual model for the effect of knowledge sharing on CSE and IS usage is shown in Figure 1.

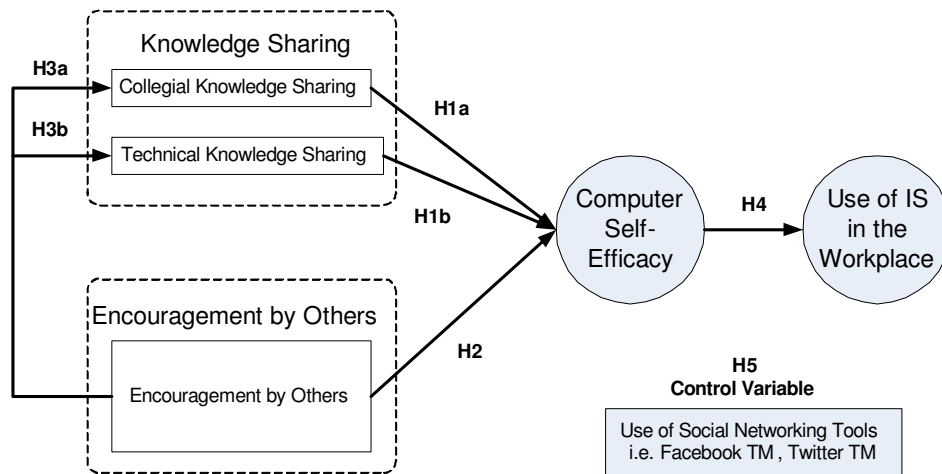


Figure 1. Conceptual model for antecedents (Knowledge sharing and Encouragement by others) of CSE.

RESEARCH METHODOLOGY

Overview and Research Hypotheses

Figure 1 provides an overview of the conceptual model of this research and identifies the research hypotheses. According to Gibbert and Krause (2002), knowledge sharing relates to the willingness of a user in an organization to share with others the knowledge he or she has acquired or created. In addition, this study primarily examined the limited research on the antecedents of CSE as noted in the meta-analysis studies conducted by Legris et al. (2003) as well as Levy and Green (2009). Specifically, this study examined the following research hypotheses:

- H1a: Collegial knowledge sharing (CKS) will exert a positive influence on users' Computer Self-Efficacy (CSE)
- H1b: Technical knowledge sharing (TKS) will exert a positive influence on users' Computer Self-Efficacy (CSE)
- H2: Encouragement by others (EBO) to share knowledge will exert a positive influence on users' Computer Self-Efficacy (CSE)
- H3a: Encouragement by others (EBO) to share knowledge will exert a positive influence on collegial knowledge sharing (CKS)
- H3b: Encouragement by others (EBO) to share knowledge will exert a positive influence on technical knowledge sharing (TKS)
- H4: CSE will exert a positive influence on use of IS in the workplace
- H5: Collegial knowledge sharing (CKS), technical knowledge sharing (TKS), Encouragement by others (EBO) to share knowledge, Computer Self-Efficacy (CSE), and use of IS in the workplace will have no significant difference based on employees' use of social networking sites

This research was conducted through a quantitative approach using a causal modeling research method (Mertler and Vannatta, 2010). This study collected data from five companies using ERP systems. AMOS™ software was used to perform the model-fit testing based on Structural Equation Modeling (SEM). According to Simon and Paper (2007), there is agreement in literature that SEM is a robust technique for a model-fit examination, superior to multiple regression analysis or regular path analysis. Moreover based on prior literature, Levy and Green (2009) suggested seven common measures of model-fit analysis. These seven model-fit measures include chi-square/degrees-of-freedom (Chi-square/df), goodness-of-fit index (GFI), adjusted goodness-of-fit-index (AGFI), normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), and root mean squared error of approximation (RMSEA). In this study, these seven model-fit measures were adopted from Levy and Green (2009). One-way analysis of variance (ANOVA) was used to test for significant differences among collegial knowledge sharing, technical knowledge sharing, encouragement by others, CSE, and use of IS based on use of social networking sites.

Survey Instrument

According to Straub (1989), an “instrument valid in content is one that has drawn representative questions from a universal pool” (p. 150). Thus, following Straub (1989)’s recommendation, a survey instrument was constructed by adopting the construct measures from prior research of collegial knowledge sharing (Davenport and Prusak, 1998), technical knowledge-sharing CSE (Hsu et al., 2007; Stone and Henry, 2003), encouragement by others (Compeau and Higgins, 1995), and use of IS (Compeau, Higgins and Huff, 1999). All the survey items used a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The survey instrument used in this study consisted of a total 27-survey item. The demographic information had six items, while the measurable constructs consisted of 21-items: collegial knowledge sharing (CKS1 to CKS5), technical knowledge sharing (TKS1 to TKS5), encouragement by others (EBO1 to EBO3), CSE (CSE1 to CSE4), use of IS (UIS1 and UIS2), and use of social networking sites (SNS1 and SNS2). The survey instrument was validated by a panel of IS experts and pilot-tested to establish the reliability of the instrument (Mertler and Vannatta, 2010).

ANALYSES AND RESULTS

Data Collection

The survey instrument was designed and delivered using a Web-based format to rapidly distribute the survey, prevent data entry errors, and validate data entry when participants are submitting the survey. This study solicited 755 participants from five different organizations that included an aviation-service company, a property-management company, an educational institution, a government technology service provider, and a professional communications-electronics group. Response rate was around 34%, yielding 253 usable responses.

Reliability Analysis

The Cronbach’s Alpha reliability test was conducted on CKS, TKS, EBO, CSE, and UIS constructs to determine the construct reliability across each measured construct. Table 1 provides the reliability analysis results. According to Mertler and Vannatta (2010), a Cronbach’s Alpha score of over .70 represents a reliable construct. The results of our study indicate that all measured constructs demonstrated high reliability.

Construct	Items per Construct	Cronbach’s Alpha
Collegial Knowledge Sharing (CKS)	5	.878
Technical Knowledge Sharing (TKS)	5	.846
Encouragement of Others (EBO)	3	.850
Computer Self Efficiency (CSE)	4	.919
Use of Information Technology (UIS)	2	.881

Table 1 Cronbach’s Alpha (N=253)

Structured Equation Modeling (SEM)

The Analysis of Moment Structures (AMOS™) software was used in addressing the hypotheses. Table 2 shows the results from four different models tested to determine the best goodness-of-fit model. Model 1 was the original conceptual model, and the overall goodness-of-fit was acceptable in that RMSEA was equal to 0.61 and GFI was 0.892. According to Somers, Nelson, and Karimi (2003), Chi-Square/df less than 2 indicates a higher quality of model fit. Schumacker and Lomax (2010) suggested that a CFI level between 0.9 and 0.95 reflects a good fit. Model 1 GFI was in the acceptable range. Model 2 deleted one-way paths from EBO → TKS and EBO → CKS in the original conceptual model, and the results showed a slight decrease in GFI, AGFI, NFI, and CFI levels, whereas Chi-square/df and RMSEA had increased. Even though the EBO one-way paths between variables were deleted, Model 2 results were within marginally acceptable levels. Although Models 1 and 2 were in acceptable ranges, Model 3 had slightly better results than the other models evaluated against the model-fit criteria. Model 3 deleted TKS5 to obtain a higher Cronbach’s Alpha for the survey construct TKS. As a result, Chi-Square/df was less than 2 indicating a higher quality of model fit. Lastly, Model 4 deleted the survey item TSK5 and one-way paths from EBO → TKS and EBO → CKS. As a result, Chi-square/df and RMSEA were the highest of all models. When comparing Model 4 against Model 3, the goodness-of-fit results indicated slight lower GFI, AGFI, NFI, and CFI levels.

Model Fit Index	Recommended Values*	Model 1 Original Model	Model 2 Original Model Without EBO One-way Paths	Model 3 Original Model Without TKS5 (Final Model)	Model 4 Original Model Without TKS5 and EBO One-way Paths
Chi Square	nr	284.441	323.732	253.865	293.641
Degree of Freedom	nr	146	148	129	131
Chi-square/df	<3.00	1.948	2.187	1.968	2.242
Goodness of fit (GFI)	>0.90	.892	.873	.899	.878
Adjusted goodness of fit (AGFI)	>0.80	.860	.837	.866	.841
Normalized fit index (NFI)	>0.90	.900	.887	.908	.894
Comparative fit index (CFI)	>0.90	.948	.935	.952	.938
Root mean squared error of approximation (RMSEA)	.05 to .08	.061	.069	.062	.70

Table 2. Summary of the Conceptual Model Tests (N = 253)

* - per Chau (2001); Schumacker and Lomax (2010)

nr - not reported

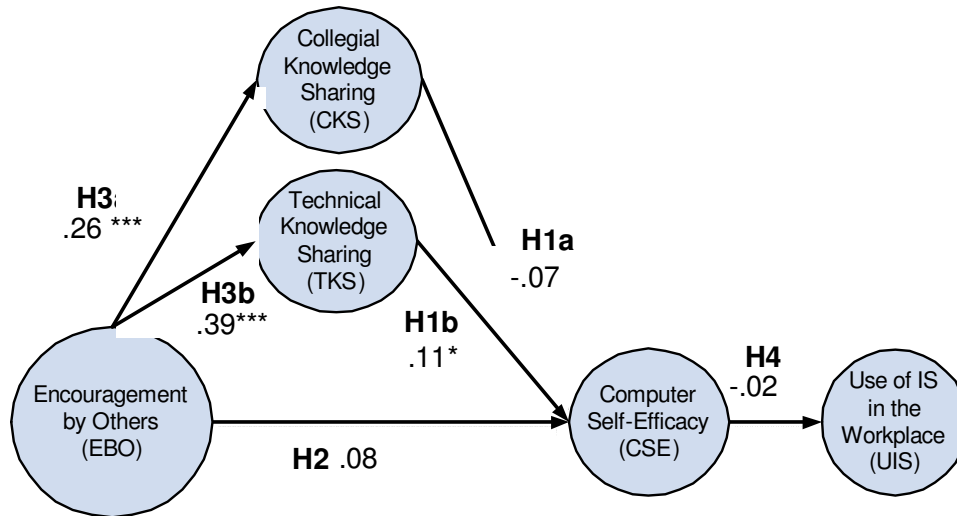
The SEM analysis was used to empirically test the conceptual model and provided quantitative estimates of relationships between variables. The findings in Table 3 indicate Maximum Likelihood Estimates for hypothesized paths.

Path	Estimate	Standard Error (S.E.)	Critical ratio (C.R.)	Significance
EBO to TKS	.253	.069	3.684	.000***
EBO to CKS	.395	.076	5.175	.000***
TKS to CSE	.109	.074	1.474	.140
EBO to CSE	.076	.076	1.010	.312
CKS to CSE	-.072	.067	-1.075	.283
CSE to UIS	-.015	.055	-.277	.782

Table 3. Maximum Likelihood Estimates for Hypothesized Paths

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Figure 2 shows the final SEM analysis of Model 3.



* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Figure 2 Structural Equation Modeling results of Model 3.

The finding from Table 3 indicated that CKS path analysis identified that the CKS independent variable is not a significant ($p = .283$) predictor of CSE.

One Way Analysis

One-way analysis of variance (ANOVA) was used to determine if there are significant differences among CKS, TKS, CSE, EBO, and UIS, based on SNS (I usually spend a lot of time using social networking sites (Facebook™, Linkin™, or Twitter™, etc.) in my workplace). The analysis showed four items out of 18 items demonstrated significant ($p < 0.05$ and $p < 0.001$). Table 4 provides a summary of the results.

Construct Item	F	Sig.
CKS2	5.569	.000***
CKS4	2.490	.044*
CKS5	5.220	.000***
TKS2	4.640	.001***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4. ANOVA test results (N = 253)

DISCUSSION

Summary of the Results and Conclusions

This study investigated the use of IS in the workplace by examining the antecedents of CSE. The problem addressed in this research was users’ limited use of IS due to incomplete knowledge, which undermines organizations’ efforts to achieve greater productivity. Based on a review of relevant IS literature, a theoretical model was formed to evaluate sharing of knowledge including collegial knowledge sharing and technical knowledge sharing. Our study addressed seven hypotheses, which is based on Social Cognitive Theory and human-assisted dimension of CSE through social interaction within an individual’s reference group. The underlying mechanism in this study’s research question was socialization, which linked the research question to the hypotheses. In addition to assessing the individual’s reference group interaction, this study examined the effects that use of social networking sites have on one’s engagement in knowledge sharing.

The main goal of this study was to assess and empirically validate a theoretical model for antecedents of CSE, as shown in Figure 1. We investigated the effects of knowledge sharing and encouragement by others has on CSE and use of IS in the workplace. Based on previous CSE research, this study examined the gap that existed by linking knowledge sharing and encouragement by others to individual's use of IS. The main research question that this study addressed was: What role do knowledge sharing and encouragement by others to share knowledge play in influencing users' CSE and their use of IS in the workplace? This study validates the research goal and question based on the use of theoretical Model 3. Our analysis found that Model 3 had slightly more significant fit than the other models evaluated against the model-fit criteria. Model 3 results were contributed to removing a problematic TKS item, which resulted in obtaining an overall higher Cronbach's Alpha score.

Study Limitations

Like any empirical study, this study is not immune from limitations. There were two observed limitations for this study. The first limitation is that this study did not address all the communication media that colleagues can use to share knowledge, such as meetings. Instead, it focused on knowledge sharing in an individual reference group and using social networking sites like Facebook™ to transfer tacit knowledge. The second limitation of this study was the use of professional organizations. This study recorded the educational level of sample participants as 29.1% holding a Bachelor degree, 49% holding a Master degree, 2.8% holding a Professional doctorate degree (MD, DDS, etc.), and 5.1% holding a Ph.D. degree. Higher levels of education have previously been empirically associated with enhanced computer abilities (Chau, 2001; Hubona and Kennick, 1996; Zmud, 1979). McQueen and Mills (1998) suggested that educational level had a positive effect on CSE, so that workers with higher levels of education and training had more confidence in their competencies for the use of computers. Another limitation was the model used a compound construct such as encouragement by management, encouragement by supervisors, and encouragement by colleagues. These compound constructs may have different effects or potentially override the other (e.g. management's encouragement). A future research direction could be in the line of strengthening UIS survey items by increasing the number of items used to measure IS use in the workplace. The negative path analysis results between CSE and UIS in this study warrants the examination how strengthening the UIS survey items would influence the relationship among these constructs.

Study Implications

This study makes valuable contributions to IS research and practice. From the research standpoint, the current study expanded the previous research on CSE antecedents to determine the effect of knowledge sharing and encouragement by others to share knowledge, on CSE and the use of IS. Previous studies focused upon predictors or determinants of acceptance such as ease of use, usefulness, physical system attributes, and individual characteristics such as computer anxiety and self-efficacy (Davis, 1989; Hubona and Kennick, 1996; Stone and Henry, 2003). This study provided some theoretical clarity on the individual's use of IS and investigated the path analysis of knowledge sharing and encouragement by others to share knowledge, to assess their contribution to CSE as well as the use of IS within the workplace.

From a practical perspective, our results provide insight that can be used by management in developing effective courses of action to improve use of ERP systems in the workplace. This research provided evidence that encouragement by others to share knowledge has a positive influence on collegial knowledge sharing and technical knowledge sharing. The findings of this study suggest that managers, supervisors, and peers should encourage sharing of knowledge within an individual's reference group. The second practical implication of this study was the use of social networking sites within the workplace to share knowledge. In agreement with previous work, this study found that the participants that had high usage of social networks within the workplace also appeared to share knowledge with colleagues significantly more. However, our study results suggest that there is additional need to further examine the role of social networking sites, especially professional sites, in predicting CSE and use of IS. The lessons learned in this study can be applied by others researchers to perform future research.

Future Research

Although this study provided some insight on the impact of knowledge sharing and encouragement by others on the use of IS in the workplace, more research is undoubtedly needed to provide further understanding of these CSE antecedents of the use of IS, especially given the inconclusive results regarding the path between CSE and IS Use. First, the non-significant effect of collegial knowledge sharing on CSE warrants additional investigation. Given that perceptions of data gathered on collegial knowledge sharing and CSE, a negative path coefficient would be a promising area for future research. Another interesting research area would be the mediating role of CSE between knowledge sharing and use of IS in the workplace that was supported in this model. Because a key hypothesis of this study was linking knowledge sharing to IS use in the workplace, future research could examine the elimination of CSE within this study model to determine the influence of knowledge sharing and encouragement by others on IS use in the workplace. This study found CSE to be non-significant in influencing

the use of IS. Our study results suggest the need to further examine the role of social networking sites in knowledge sharing, CSE, and Use of IS. Another future study could test the direct path between management encouragement and Use of IS.

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