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# Factors influencing employees' usage behavior of KMS in e-business

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## Abstract

*The shift from a product-based to a knowledge-based economy has resulted in an increasing demand for organizations to implement knowledge management systems (KMS) at an accelerating pace. However, little attention has been paid to what influences the employees' intention to use such. This study presented an integrative framework to explore factors affecting employees' KMS usage behavior, particularly social and political ones. Results from a sample of 144 employees mostly from four international semiconductor manufacturing companies in the Hsin-Chu Science-based Industrial Park in Taiwan strongly support the integrative framework in predicting employees' intention to use KMS. The analysis shows that subjective norm, perceived usefulness, perceived ease of use, and perceived power security all have significant positive influence on KMS usage. In addition, interaction effects of subjective norm, computer self-efficacy, and perceived power security on perceived ease of use and perceived usefulness were also found. These findings may help IT departments to develop KMS which are well accepted by employees, and provide IT managers more insight into methods of promoting this new technology.*

**Keywords:** Behavioral intention to use, Computer self-efficacy, Knowledge management systems (KMS), Perceived ease of use; Perceived usefulness, Perceived power security, Subjective norm

## 1. Introduction

Knowledge management systems refer to a class of information systems applied for managing organizational knowledge. They are IT-based systems developed to support the organizational knowledge management behavior (Alavi and Leidner 2001). In face of the volatility and rate of change in business environment, globalization of markets and labor pools, organizations worldwide are devoting considerable resources to implementing knowledge management systems at an accelerating pace, and view knowledge as their source of core competency or competitive advantage (Alavi and Leidner 2001; Duffy 2001a; Hansen et al. 1999; von Krogh 1998; Zack 1999). Undoubtedly, implementing KMS successfully to help organizations manage knowledge effectively is recognized as, perhaps, the most significant factor in determining organizational success, and has become an increasingly critical issue for technology implementation and management.

Knowledge is an important competitive resource for employees within their organizations, thus making private knowledge publicly accessible may cause them to feel

insecure and affect their willingness to use KMS. This is a political issue. However, prior research has paid little attention on employees' concerns about loss of power and influence through the sharing of information/knowledge in contexts of KMS. According to the interaction theory, this study proposes the new construct of "perceived power security" to enhance the understanding of employees' intention to use KMS. On the other hand, KMS have a number of technologies with functionalities that are different from traditional information systems, including knowledge manipulation, document management, text search and retrieval, and knowledge mapping (e.g., Alavi and Leidner 2001; Bowman 2002; Browne et al. 1997; Duffy 2001b; Grover and Davenport 2001; Holsapple and Joshi 2002; Howard 1989; Rowley 2002; Vail III 1999), representing some complex applications of IT (e.g., knowledge manipulation, document management, text search and retrieval, etc) that may partly affect users' intention to use KMS. Thus, existing variables can not fully reflect what influences employees' intention to use KMS. In addition to two key beliefs: perceived usefulness and perceived ease of use, we use computer self-efficacy and subjective norm to better understand what influences employees' intention to use KMS.

## **2. Theoretical development**

Figure 1 employed in this study depicts five variables were integrated for the empirical study of KMS. Our study hypothesizes that employee's perception of behavioral intention to use is determined by four beliefs: subjective norm, perceived usefulness, perceived ease of use, and perceived power security. In addition, we examine interaction effects of subjective norm, computer self-efficacy, and perceived power security on perceived ease of use and perceived usefulness.

### **2.1. Subjective norm**

Subjective norm is one direct determinant of behavioral intention in TRA (Fishbein and Ajzen 1975) and the subsequent Theory of Planned Behavior (TPB) (Ajzen 1991), which is defined as the degree to which an individual believes that people who are important to her/him think she/he should perform the behavior in questions. Here, we tap into social influences via subjective norm and think that employees are likely to be influenced when deciding whether to use the KMS by both what their supervisors may think, due to possible impact on their performance; and by what their peers think, due to the competitive nature of the environment within an organization. In addition, they are influenced by the need to work in teams with other employees. Furthermore, prior research has provided evidence that subjective norm has a significant effect on behavioral intention to use, either directly or indirectly, through its effects on perceived usefulness (Karahanna et al. 1999; Taylor and Todd 1995; Venkatesh and Davis 2000; Venkatesh and Morris 2000). Thus, we hypothesized:

H1: Subjective norm will have a positive effect on behavioral intention to use KMS.

H2: Subjective norm will have a positive effect on perceived usefulness of KMS.

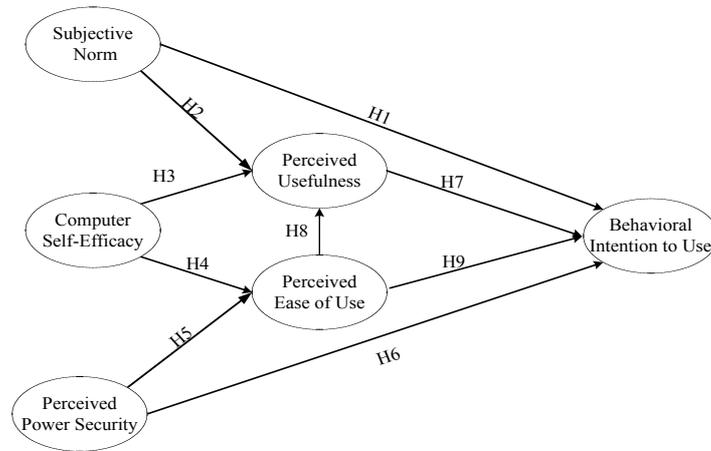


Fig. 1. Research model

## 2.2. Computer self-efficacy

In an IS/IT context, computer self-efficacy is defined as “an individual’s perceptions of his or her ability to use computers in the accomplishment of a task, rather than reflecting simple component skills” (Compeau and Higgins 1995). Significant influences of computer self-efficacy on perceived usefulness have been empirically validated (Chau 2001; Ong et al. 2004). Additionally, the relationship between computer self-efficacy and perceived ease of use was developed from theoretical argument (Mathieson 1991) and this was empirically examined to see whether there exists a causal link between computer self-efficacy and perceived ease of use (Agarwal et al. 2000; Hong et al. 2001; Ong et al. 2004; Venkatesh and Davis 1996). These suggest that computer self-efficacy has a significant positive effect on perceived ease of use of KMS. Therefore, we hypothesized:

H3: Computer self-efficacy will have a positive effect on perceived usefulness of KMS.

H4: Computer self-efficacy will have a positive effect on perceived ease of use of KMS.

## 2.3. Perceived power security

Interaction Theory (Joshi 1991; Kling 1980), one perspective of Resistance Theory, attributes causality to the interaction between people and system factors, and has the notions that systems acquire different political and social meanings in different settings and that different users perceive the effects of the same system differently. Resistance may manifest itself as a result of shifting power relationships (Jiang et al. 2000). However, knowledge is power (Gupta and Govindarajan 2000) and information technology changes power (Malone

and Rockart 1991). Thus, making private knowledge publicly accessible may result in power redistribution that certain organizational cultures may strongly resist (Zack 1999).

Conceivably, employees who transferred their own knowledge into KMS cause power shifts with it, and so they will probably resist KMS due to their concerns with power relationships. These are negative expectations raised by employees. The more negative the employees' expectations, the more negative the affective reactions including apprehension, anxiety, stress, and fear will be (Martinko et al. 1996). Hackbarth et al. (2003) had shown that there was a negative relationship between computer anxiety and users' perception of ease of use. On the other hand, in a literature review devoted to examining fear of computers, Davidson and Walley (1985) describe several forms of resistance associated with the introduction of computers including inability to use and refusals to use the computers. Hence, the more power insecurity concerns an employee has, the less perceived ease of use and intention to use she or he may have.

The preliminary literature described above has depicted that power and knowledge shifts cause resistance (Markus 1983), implying knowledge and power features were important when considering employees' intention to engage in KMS. Thus, this study proposes a new construct, "*perceived power security*," regarding power and influence issues to enhance the understanding of employees' intention to use KMS. In contrast with previous research, this study uses a more limited definition. Perceived power security is defined as the degree to which a person believes that using a particular system will be free from threats of insecurity regarding loss of power and influence. We expect that with higher perceived power security of an employee, there will be lower anxiety. This would cause employees to use KMS more easily. Thus, we hypothesized:

H5: Perceived power security will have a positive effect on perceived ease of use KMS.

H6: Perceived power security will have a positive effect on behavioral intention to use KMS.

#### **2.4. *Perceived usefulness and perceive ease of use***

The Technology Acceptance Model (TAM) (Davis 1989; Davis et al. 1989), adapted from the Theory of Reasoned Action (TRA) (Ajzen 1991; Fishbein and Ajzen 1975), has been used as the theoretical basis for many empirical studies of user technology acceptance (e.g. Davis 1989; Davis et al. 1989; Kim and Mueller 1978; Venkatesh 2000). It appears to be the most promising direction to overcome the problem of underutilized systems and increase users' behavioral intention to use by two key beliefs, namely perceived ease of use and perceived usefulness. Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance (Davis 1989). Within a company, employees with high levels of perceived usefulness is one for which a user believes

that there is a positive user-performance relationship. The ultimate reason that employees exploit KMS is that the system improves their performance. Perceived ease of use is the degree to which a person believes that using a particular system would be free of effort (Davis 1989). It is expected to influence perceived usefulness and behavioral intention to use. Extensive research over the past decade has provided evidence that perceived ease of use has a significant effect on behavioral intention to use, either directly or indirectly, through its effects on perceived usefulness (Agarwal and Prasad 1999; Davis et al. 1989; Ong et al. 2004; Venkatesh 1999). Thus, we hypothesized:

H7: Perceived usefulness will have a positive effect on the behavioral intention to use KMS.

H8: Perceived ease of use will have a positive effect on perceived usefulness of KMS.

H9: Perceived ease of use will have a positive effect on behavioral intention to use KMS.

### **3. Research Design**

The respondents self-administered a 18-item questionnaire. For each question, respondents were asked to circle the response which best described their level of agreement with the statements. Of the 200 questionnaires, 144 useful responses were returned, a response rate of 72 percent. Most respondents were engineers (e.g., process, software, and planning engineers) and all the respondents had prior experience in using KMS. The respondents averaged 30.3 years in age and had 9.9 years of experience in computers; the male-to-female ratio was approximately 4.7 to 1. Forty percent had completed only one college or university degree, and a further 56 percent had completed post-graduate degrees.

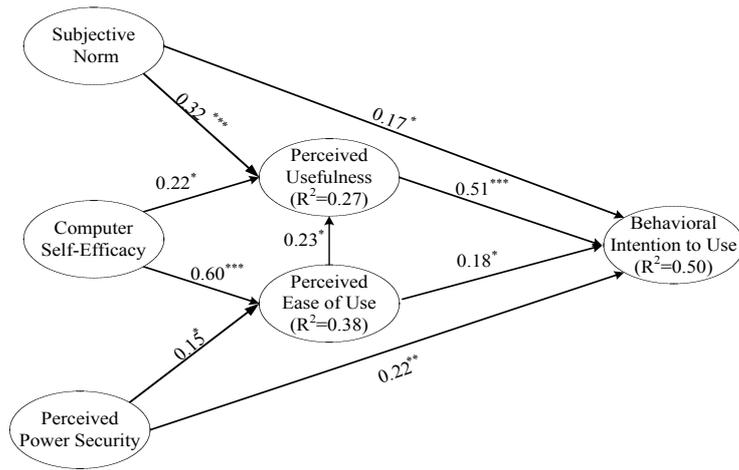
To ensure content validity of the scales, the items must represent the concept about which generalizations are to be made. Thus, items selected for the constructs were adapted mainly from previous research. Four items measuring computer self-efficacy were adapted from a prior research (Compeau et al. 1999). Items measuring perceived usefulness and perceived ease of use were taken from a previously validated inventory (Davis 1989) and modified to fit the specific technology studied. Subjective norm measured by the two items was adapted from Venkatesh and Morris (2000). Two statements specifically developed for this study measured perceived power security. Finally, the items measuring behavioral intention to use were taken from previous research (Venkatesh and Davis 1996). All the items were modified to make them relevant to the KMS usage context. The respondents were asked to indicate their agreement or disagreement with the survey instruments using a seven-point Likert-type scale.

#### 4. Data analysis and results

Measurement validity in terms of reliability and construct validity was strictly evaluated. Reliability of the instrument was evaluated using Cronbach's alpha (Cronbach 1951). All the values were above 0.8, exceeding the common threshold value recommended by Nunnally (1978). A Modified MTMM using correlation matrix was applied to examine construct validity in terms of convergent and discriminant validity (Doll and Torkzadeh 1988). Convergent validity determined whether associations between scales of the same factor are higher than zero and large enough to proceed with discriminant validity tests (Aladwani and Palvia 2002). After examining the correlation matrix, the results revealed that the six lowest within-factor correlations are: computer self-efficacy = 0.52; perceived usefulness = 0.68; perceived ease of use = 0.56; subjective norm = 0.78; perceived power security = 0.76; and behavioral intention to use = 0.79. In addition, each smallest within-factor correlation was considerably higher among items intended for the same construct than among those designed to measure different constructs. This suggests adequate convergent and discriminant validity of the measurement.

The hypothesized relationships were tested using the CALIS procedure of SAS 8.1, providing estimates of parameters and tests of fit for linear structural equation model similar to LISREL. All the seven common goodness-of-fit indexes were chi-square/degrees of freedom = 2.17, GFI = 0.84, AGFI = 0.77, NFI = 0.86, NNFI = 0.89, CFI = 0.92, and RMSR = 0.14. Even though some of them failed to meet the recommended minimum levels, they are acceptable to suggest that the model fit was reasonable to assess the results for the structural model. The results support all hypotheses and the proposed model explains 27 percent of the variance in perceived usefulness, 38 percent of the variance in perceived ease of use, and up to 50 percent of the variance in behavioral intention to use.

According to the path coefficients shown in Figure 2, it is worthy to mention that SN has the second largest total effect on BI, showing its total effects of 0.33 on BI ( $0.17+0.32*0.51$ ), only less than that of PU. As expected, CSE was found to be another factor influencing BI by its indirect effects. The total effects of CSE on BI were 0.29. PPS, despite showing slightly weaker total effects than that of PEOU on BI, exhibited the second largest direct effect on BI (beta = 0.22). The total effects of PPS on BI were 0.26. PU exhibited the strongest direct effect and total effect on BI (beta = 0.51). The direct, indirect, and total effects of SN, CSE, PPS, PU, and PEOU on BI are summarized in Table 1.



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

Fig. 2. Model testing results

## 5. Discussion

### 5.1. Summary of findings

Although subjective norm was not considered as an important ‘direct’ determinant of a user’s behavioral intention to use KMS, it shows the second largest total effect on behavioral intention to use after taking indirect effects into consideration. It indicates that subjective norm was found to be another important factor affecting employees’ behavioral intention to use KMS and its indirect effects should be considered seriously. This finding implies that the expectations/influences from interpersonal networks appear to be crucial to user perceptions of behavioral intention to use. For employees, the opinions of significant referent groups, including peers, supervisors, and managers, will significantly affect the pressure felt to use KMS. Furthermore, employees may be more likely influenced to use KMS by what their managers may think, due to possible impact on their performance.

Computer self-efficacy appeared to be a significant determinant of perceived usefulness and perceived ease of use. Consistent with our hypotheses, users who have higher computer self-efficacy are likely to have more positive usefulness and ease of use beliefs. This finding also supports prior research revealing that computer self-efficacy as an important factor affecting employees’ intention to use KMS through the mediation of perceived usefulness and perceived ease of use.

Table 1. The direct, indirect, and total effects of dominants on behavioral intention to use

	Direct effects			Indirect effects			Total effects		
	PU	PEOU	BI	PU	PEOU	BI	PU	PEOU	BI
CSE	0.22	0.60		0.14		0.29	0.36	0.60	0.29
PU			0.51						0.51
PEOU	0.23		0.18			0.12	0.23		0.30
SN	0.32		0.17			0.16	0.32		0.33
PPS		0.15	0.22			0.04		0.15	0.26

As expected, perceived power security was found to be another important factor influencing employees' behavioral intention to use KMS. It has the second largest direct effects on behavioral intention to use and its total effects were slightly smaller than that of perceived ease of use. This finding indicates that it is not sufficient to develop a KMS with valuable functions and user-friendly interaction to attract more users. It is of paramount importance to develop a KMS which can assure employees that they are free from the threats of loss of power and influence. Knowledge is one kind of resource and competitive advantage to employees. Conceivably, employees who transferred knowledge into KMS caused power shifts with it, probably leading to concerns about their power relationships, influences, status, and job content. Such concerns can cause employees to resist new technology (Jiang et al. 2000). Insecurity regarding power and influence loss will affect employees' willingness to use KMS. Thus, one important key factor affecting employees' willingness to accept/use KMS is users' perception of power insecurity as a result of shifting power relationships related to social status and job security when using the KMS.

Judged by its direct effects and total effects on behavioral intention to use, perceived usefulness was found to be the most significant factor affecting the acceptance of KMS by employees. This finding is consistent with prior studies (e.g., Hong et al. 2001; Ong et al. 2004; Venkatesh and Davis 2000). It seems that a linkage between expectations of usefulness and usage of KMS is attractive and important to employees. Thus, an essential criterion is whether or not the KMS provides useful knowledge for fulfilling the needs of an individual professional for potential gains in job. The described evaluation criterion or rationale may be, in part, rooted in employees' tendency to view a KMS as a tool, acceptable only when proven to provide desired utility to them. We believe that perceived ease of use plays a critical role because KMS indeed represents some complex applications of KM activities, including searching, coding, retrieving, manipulating, and collaboration in KMS.

### ***5.3. Implications***

These findings have several implications for KMS management. First, perceived usefulness has the most significant effect on behavioral intention to use. Thus, it is most important for KMS to provide useful knowledge to enhance employees' job performance or productivity. Useful knowledge content being high-quality, correct, integral, logical, easy to read, and usable will add value to KMS, and encourage employees to use it (Duffy 2001b; Holsapple and Winston 1987; Rowley 2002; Zack 1999). Second, perceived ease of use was found to be an important factor affecting employees' behavioral intention to use KMS. We believe that perceived ease of use plays a critical role because KMS indeed represents some complex applications of IT that offer many challenges. Several factors contribute to KMS complexity: (1) Content represents knowledge, which is stored in knowledge repositories in

different locations, but it is a challenge for employees to search/retrieve “right” knowledge from the “right” location. (2) Much knowledge in organizations is uncodified and tacit in that it exists only in the minds of individuals spread over the organization. Transferring the internal expertise into codified knowledge in a KMS requires lots of employee efforts, so having an easy way to manipulate knowledge is increasingly crucial to employees. (3) There is a need to encourage collaboration in order to maximize the synthesis effects of employees’ knowledge and avoid complications due to KMS in organizations because collaboration enables team members to communicate freely without fear of criticism, to participate when, and if, they have something valuable to contribute, to acknowledge their membership in an identifiable community. Only a collaborative environment with user-friendly interaction can attract more employees to use and will make them feel a sense of immediate gratification. Third, neither Davis et al. (1989) nor Mathieson (1991) found a significant effect of subjective norm on behavioral intention to use. In contrast, Venkatesh and Davis (2000) found that subjective norm had a positive effect on behavioral intention to use only in mandatory contexts. Although user acceptance research examining the direct effects of subjective norm on behavioral intention to use has yielded mixed results, we indeed found such an influence in a KMS context, which provides some contributions to IS/IT literature. This study confirms that subjective norm had the second largest total effects on behavioral intention to use KMS, suggesting that employees are likely to be influenced when deciding whether to use KMS by their managers, supervisors, friends, and peers. For this task, human resource departments can initiate knowledge communities to attract employees to engage in KMS due to the influences from networks of friends and peers who may not be in the same part of organization, but have the same work interests (Davenport 2000; Grover and Davenport 2001; Rowley 2002; Storck and Hill 2000). Fourth, this study confirms the significant influence of perceived power security on behavioral intention to use KMS in addition to showing that perceived usefulness and perceived ease of use are important to employees’ behavioral intention to use KMS. This finding suggests that managers must assure employees that they are free from threats of losing power or influence by providing a clear reward/incentive system to determine their performance or bonus. Human resource departments and managers can develop incentive and reward systems to encourage employees to use KMS by improving their performance, or providing bonuses/incentives to them (Alavi and Leidner 2001; Gupta and Govindarajan 2000). Fifth, computer self-efficacy plays another important role in predicting employees’ intention to use KMS. In businesses, human resource managers can provide training courses to increase employees’ familiarity with computing technologies. This kind of education need not be very formal and may take any form (e.g., seminars and informal discussions). The main purpose would be to let the organization’s members gradually develop their level of computer literacy. Even if these

courses are not directly related to KMS itself, they can still help the employees to more easily develop positive beliefs of usefulness and ease of use for the new technology.

## 6. Conclusions

First, our results demonstrate how perceived power security influences employees' attitudes toward using KMS: they must assure employees that they are free from the threats of losing power or influence. This finding is a new contribution to the IS/IT literature. Second, subjective norm has the second largest total effects on behavioral intention to use KMS. Employees can be influenced by referent groups, including managers, supervisors, friends, and peers. Third, perceived usefulness has the most significant effect on behavioral intention to use KMS, so KMS must maximize its usefulness by providing useful knowledge to attract 'pragmatic' employees to get potential gains. Useful knowledge content being high-quality, correct, integral, logical, easy to read, and usable will add value to KMS, encouraging employees to use it. Fourth, perceived ease of use was found to be an important antecedent of perceived usefulness. User-friendliness is also important for the success of KMS and will increase employees' perceptions of perceived usefulness. Fifth, the results depict that computer self-efficacy has a positive effect on behavioral intention to use, either through perceived usefulness or perceived ease of use.

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