

## ABSTRACT

Title of Dissertation: MINDFUL USE AS A LINK BETWEEN SOCIAL CAPITAL AND ORGANIZATIONAL LEARNING: AN EMPIRICAL TEST OF THE ANTECEDENTS AND CONSEQUENCES OF TWO NEW CONSTRUCTS

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The motivation for this research is that information systems are not often used to their full potential – individuals often fail to use valuable features of systems not allowing firms to maximize their return from investments in these technologies. Additionally, there have been recent calls for new conceptualizations of system use and for research that examines post-adoption use. Therefore, the current research develops two new conceptualizations of system use: full appropriation and heedful use. These new concepts can help address under-utilization issues and fill gaps in the current literature. *Full appropriation* is fully exploiting applicable features of a system and *heedful use* is interacting with a system in a way that considers the needs of others within an organization. These conceptualizations are developed from psychological theories on mindfulness which have not been used to study system use. It is expected that a mindful approach to technology can lead to many positive benefits in the workplace. The first step in the current research was to develop and validate measures for these two new forms of use. Then the predictors of full appropriation and heedful use were examined with a social capital lens. The final step of this research was to examine the influence that these broader forms of use have on organizational learning since it has been

suggested that organizational learning is the missing link between IT and firm performance. Data from 591 subjects from two separate organizations provided evidence of construct validity of the two newly developed scales and provided support for the overall model indicating a relationship between social capital and mindful use and a relationship between mindful use and organizational learning.

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ORGANIZATIONAL LEARNING: AN EMPIRICAL TEST OF THE ANTECEDENTS  
AND CONSEQUENCES OF TWO NEW CONSTRUCTS

by

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## CHAPTER 1: INTRODUCTION

Despite large investments in current information technologies, many organizations are not maximizing their return on these complex systems. In a recent survey, 57% of SAP customers said that they had not had a positive return on investment even though the systems had been in place for an average of 2.8 years (Nucleus Research 2004). Large system implementations often fail to meet expectations (Adam and O'Doherty 2003) partly because firms are not fully leveraging the potential value of them (Zmud 2005). Without maximizing the potential of new technology systems, it is difficult for IT to have an impact on the organization's bottom line.

Research to date has focused on the initial stages of adoption and implementation but the post-adoption phase is where return on investments can occur. It takes considerable time for users to develop an awareness of the usefulness of system features and capabilities (Jasperson, Carter, and Zmud 2005) and users socially construct technology over time as they interpret and adapt features of that technology (DeSanctis and Poole 1994; Orlikowski 2000). Researchers have revealed that users appropriate the technology in ways that were not originally intended (Orlikowski 2000). Users often go beyond the design of a system and find new ways to use the system. They also may even modify their jobs based on the features and functions of the system. Simply capturing usage during the initial stages of the system's life cycle does not capture how use emerges over time. It is critical to examine use in the post-adoption phase to gain an understanding of how ROI can be maximized (Jasperson, Carter, and Zmud 2005).



Some even suggest the reason for system failures may be a lack of focus on the post-adoption stage (Jasperson et al. 2005) where more extended use of system features can occur. Empirical evidence suggests that very few features of systems are actually used and that task or technology-related *extensions* to those features are rarely if ever used (Davenport 1998; Lyytinen and Hirschheim 1987; Mabert et al. 2001; Osterland 2000; Rigby et al. 2002; Ross and Weill 2002). In fact, one study concluded that employees only use 25% of the features embedded in technologies. In order to study the problem of under-utilized systems, researchers need to examine use of the system after initial adoption.

Previous models of use focused on the notion that users were not accepting systems and were resisting the new technology and therefore simply not using the system at all. Over time, users have come to accept systems as a mainstay in the workplace so there is now a need to more fully examine types of usage in the post-adoption phase (Jasperson et al. 2005) where returns on investment can occur (Burton-Jones and Straub 2006).

Researchers also need to address broader types of use because the types of systems in the workplace have changed. Today there are complex integrated systems that span many business functions and require coordination among users. Knowledge management systems allow users to share best practices and lessons learned so that the organizational members can learn through the experience of others. Also, in the past, systems were considered either mandatory or voluntary but with today's systems it may be mandatory to use the system but not mandatory to use all the features or to enter quality information that can be used by others. Although some researchers have

examined quality of use, the current research will take a more in-depth look at how users can be more mindful in their approach to systems in the post-adoption phase of system implementation. Approaching systems more mindfully means that users are getting more out of complex systems and therefore delivering more benefits to the organization.

By developing new views on system use, the current research addresses missing gaps about why IT does not always lead to higher firm performance. Organizations enable work processes through large investments in information systems under the assumption that these systems will create major improvements in productivity and efficiency yet that is not always the case. By examining a more mindful approach to system use, the current research provides a foundation for discovering how IT can have a more positive impact through organizational learning. This research also examines the factors that may influence an individual to get more out of the system once it has already been implemented and adopted. Understanding that mindful use may impact firm performance may not be quite as beneficial if managers do not know how to get their employees to use the system more mindfully. Therefore, the goals of the current research are:

1. Examine new forms of use
2. Address use in the post-adoption phase
3. Examine the possibility that new forms of use can have a greater impact on firm performance
4. Give managers insight into how to get users to maximize the potential of systems

### **1.1 Mindful use in the post-adoption phase**

It is important to study post-adoption use because, “organizations may be able to achieve considerable economic benefits (via relatively low incremental investment) by successfully inducing and enabling users to (appropriately) enrich their use of already-

installed IT-enabled work systems during the post-adoption stage” (Jaspersen et al. 2005). Users often approach systems mindlessly, miss valuable features of the system, and do not see the “big picture” of how the system benefits themselves as well as others within the organization. A better approach to systems is to use them more mindfully. Using systems more mindfully means using more features of the technology and using the system in a way that considers how others may need the information or capabilities of the system. It is useful to examine system usage with a mindfulness perspective because it allows for richer behavior that can lead to positive consequences. More detail on the concept of general mindfulness can be found in Chapter 2.

To address these issues, I examine *mindful* use of systems which is broken down into two types. The first type is full appropriation which is *fully exploiting applicable features of the system*. If users do not fully appropriate a system they are not maximizing the full potential of that system and without full appropriation, organizations cannot maximize their return on the investment in these systems. The definition includes the term “applicable” because full appropriation for this research does not just mean using *all* features of the system. In some cases, managers may not want all features to be used. However, studies have shown that even important features get ignored in the post-adoption phase once initial training, implementation, and acceptance have taken place. The goal of the current research is to develop this new construct so that managers can get a better understanding of the extent to which systems are being utilized and whether or not investments in these systems are worthwhile.

The second type of mindful use is heedful use which is *considering the needs of others within the organization when using a system*. Heedful use means an individual is

entering information that is useful to others or understanding how the capabilities of the system can help others. For the current research this is examined in the context of knowledge management systems where it is important for individuals to consider others when entering information. If knowledge management systems are not used heedfully then lessons learned and best practices are not passed on to others in an effective way. This knowledge may be disseminated via e-mail or face-to-face interactions but the goal of a knowledge management system is to store quality information that others can use and re-use so that the organization can actually learn from this information by having it in a permanent place that can be accessed by others at any time. Knowledge management systems also allow this knowledge to be organized in a way that makes it easier for users to access and use. If systems are used heedfully, organizations can maximize the benefits that knowledge management systems were designed to provide.

I develop and test these new constructs in the current research and then examine possible predictors and outcomes of those constructs. In terms of outcomes, I examine organizational learning because it has been suggested that this may be the missing link between IT and firm performance. Although companies are seeking to gain a competitive advantage by spending more on IT (Tippins and Sohi 2000), many are still not sure how IT impacts performance outcomes (e.g., Berndt and Morrison 1995) and many are still falling victim to the productivity paradox (Lucas 1999). Therefore, researchers have suggested that the IT has to impact organizational learning in order for firm performance to be positively influenced. In other words, the organization benefits from IT when it is used in a way that allows that organization to learn – when the technology is designed for learning and then used in a way that promotes learning, that technology can allow the

organization to reap the benefits the managers expected to have by investing in the technology. In terms of predictors, I examine social capital because there is no evidence as to what mechanisms allow social capital to have an influence on organizational learning even though the direct relationship has been established. I argue that using a system mindfully can link social relationships to organizational learning. In other words, the user's social relationships can trigger more extensive use of the system and more heedful use of the system which then impacts organizational learning. In summary, I argue that mindful use is what links social capital to organizational learning and that organizational learning is one concept that allows IT to have a positive impact on firm performance. Therefore, the research questions to be addressed are:

*RQ1: How is mindfulness theoretically related to post-adoption system use?*

*RQ2: Does having more social capital allow individuals to use systems more mindfully?*

*RQ3: Can a more mindful approach to use lead to more organizational learning?*

Chapter 2 reviews former models of system use and explains mindfulness and how it can be used to examine *post-adoption* use. I also review the literature on social capital theory and organizational learning in this chapter. Chapter 3 develops the hypotheses surrounding the idea that social capital can influence full appropriation and heedful use and that these new types of use can influence an individual's contribution to organizational learning. Following that, Chapter 4 describes the methodology used to test these relationships. Finally, Chapter 5 discusses the results and implications of the findings.

## CHAPTER 2: RELATED LITERATURE

### 2.1 Previous literature on use

A wide range of sociological and psychological theories of behavior such as the theory of reasoned action (Fishbein and Ajzen 1975) and the theory of planned behavior (Ajzen 1985) have been adapted to the context of technology implementations to understand antecedents to individual adoption and use of new technologies (e.g., Agarwal and Prasad 1998; Davis, Bagozzi, and Warshaw 1989; Moore and Benbasat 1991; Venkatesh, Morris, and Ackerman 2000). These theories posit that characteristics of technologies, subjective norms, and attitudes will influence intention to use technologies, which then leads to actual use of that technology. More recently, a unified theory of technology use has been developed which consolidates eight prior models of use (Venkatesh, Morris, Davis, and Davis 2003). Those previous models and the basic premise behind each are included in Table 1 which is reproduced directly from Venkatesh, Morris, Davis, and Davis (2003).

Table 1. Prior Theories of Acceptance and Use

|  |
|--|
| <p><b><i>Theory of Reasoned Action:</i></b><br/>         Drawn from social psychology, TRA is one of the most fundamental and influential theories of human behavior. It has been used to predict a wide range of behaviors (see Sheppard et al. 1988 for a review). Davis et al. (1989) applied TRA to individual acceptance of technology and found that the variance explained was largely consistent with studies that had employed TRA in the context of other behaviors.</p>   |
| <p><b><i>Theory of Planned Behavior:</i></b><br/>         TPB extended TRA by adding the construct of perceived behavioral control. In TPB, perceived behavioral control is theorized to be an additional determinant of intention and behavior. Ajzen (1991) presented a review of several studies that successfully used TPB to predict intention and behavior in a wide variety of settings. TPB has been successfully applied to the understanding of individual acceptance and usage of many different technologies (Harrison et al. 1997; Methieson 1991; Taylor and Todd 1995b). A related model is the Decomposed Theory of Planned Behavior (DTPB). In terms of predicting intention, DTPB is identical to TPB. In contrast to TPB, but similar to TAM, DTPB “decomposes” attitude, subjective norm, and perceived behavioral control into its underlying belief structure within technology adoption contexts.</p> |

***Technology Acceptance Model:***

TAM is tailored to IS contexts, and was designed to predict information technology acceptance and usage on the job. Unlike TRA, the final conceptualization of TAM excludes the attitude construct in order to better explain intention parsimoniously. TAM2 extended TAM by including subjective norm as an additional predictor of intention in the case of mandatory settings (Venkatesh and Davis 2000). TAM has been widely applied to a diverse set of technologies and users.

***Motivational Model:***

A significant body of research in psychology has supported general motivation theory as an explanation for behavior. Several studies have examined motivational theory and adapted it for specific contexts. Vallerand (1997) presents an excellent review of the fundamental tenets of this theoretical base. Within the information systems domain, Davis et al. (1992) applied motivational theory to understand new technology adoption and use (see also Venkatesh and Speier 1999).

***Combined TAM and TPB:***

This model combines the predictors of TPB with perceived usefulness from TAM to provide a hybrid model (Taylor and Todd 1995a).

***Model of PC Utilization:***

Derived largely from Triandis' (1977) theory of human behavior, this model presents a competing perspective to that proposed by TRA and TPB. Thompson et al. (1991) adapted and refined Triandis' model for IS contexts and used the model to predict PC utilization. However, the nature of the model makes it particularly suited to predict individual acceptance and use of a range of information technologies. Thompson et al. (1991) sought to predict usage behavior rather than intention; however, in keeping with the theory's roots, the current research will examine the effect of these determinants on intention. Also, such an examination is important to ensure a fair comparison of the different models.

***Innovation Diffusion Theory:***

Grounded in sociology, IDT (Rogers 1995) has been used since the 1960s to study a variety of innovations, ranging from agricultural tools to organizational innovation (Tornatzky and Klein 1982). Within information systems, Moore and Benbasat (1991) adapted the characteristics of innovations presented in Rogers and refined a set of constructs that could be used to study individual technology acceptance. Moore and Benbasat (1996) found support for the predictive validity of these innovation characteristics (see also Agarwal and Prasad 1997, 1998; Karahanna et al. 1999; Plouffe et al. 2001).

***Social Cognitive Theory:***

One of the most powerful theories of human behavior is social cognitive theory (see Bandura 1986). Compeau and Higgins (1995b) applied and extended SCT to the context of computer utilization (see also Compeau et al. 1999); while Compeau and Higgins (1995a) also employed SCT, it was to study performance and thus is outside the goal of the current research. Compeau and Higgins' (1995b) model studied computer use but the nature of the model and underlying theory allow it to be extended to acceptance and use of information technology in general. The original model of Compeau and Higgins (1995b) used usage as a dependent variable but in keeping with the spirit of predicting individual acceptance, we will examine the predictive validity of the model in the context

of intention and usage to allow a fair comparison of the models.

Since the unified theory consolidates previous theories, it is the only one that will be discussed in depth here. The unified theory consists of four overarching constructs that represent the technology perceptions that explain technology acceptance and use: (1) performance expectancy, defined as “the degree to which an individual believes that using the system will help him or her better attain significant rewards” (p. 447), (2) effort expectancy, defined as “the degree of ease associated with the use of the system” (p. 450), (3) social influence, defined as “the degree to which an individual perceives that important others believe he or she should use the new system” (p. 451), and (4) facilitating conditions, defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (p. 453). The theory states that these positive perceptions about the technology will lead to a greater propensity to use the system. Commonly studied constructs such as ease of use and usefulness from the Technology Acceptance Model are encompassed in these perceptions.

The unified model, and the theories on which it was based, were established to explain the *initial* acceptance and use of technology. In other words, these theories were focused on adoption and not the on-going use that occurs post-adoption. Therefore, to answer calls for research that fills this gap (Jasperson et al. 2005); the current research addresses types of use that may occur post-adoption. However, the constructs from the unified theory will be tested as predictors of mindful use since it is suggested that the same individual cognitions that influence general use will also influence post-adoption use (Jasperson et al. 2005). This analysis can be found in Appendix D.



There have been a few prior attempts at broadening the examination of use which could apply to the post-adoption phase. A summary of those studies follows in Table 2.

| Author/Date  | New conceptualization of use   |
|--|--|
| Saga & Zmud (1994)   | Infusion of technology – “the extent to which an innovation’s features are used in a complete and sophisticated way” (Fichman, 2000, p. 110). This includes three levels of infusion: <ul style="list-style-type: none"> <li>a) Extended use</li> <li>b) Integrative use</li> <li>c) Emergent use</li> </ul> |
| Auer (1998)  | Taxonomy of issues for holistic view of quality of use   |
| Nambisan, Agarwal, & Tanniru (1999)  | Intent to explore – willingness to find new ways to apply IT to work tasks   |
| Lassila & Brancheau (1999); Weber (1997); DeSanctis & Poole (1994); Burton-Jones & Straub (2003) | Deep structures of an information system vs. surface structures. Deep structures include the underlying data and relationships among the data whereas surface structures include formatting and presentation features.   |
| Lassila & Brancheau (1999)   | Stages of software use: <ul style="list-style-type: none"> <li>a) Low integration or limited use</li> <li>b) Standard adoption</li> <li>c) Expanding or use that involves a redesign of work processes</li> <li>d) High integration or use that allows extensions to the software capabilities</li> </ul>    |
| Burton-Jones & Straub (2006)   | Reconceptualizing use in terms of user, system, or task depending on what is most relevant for the given research and for the other constructs within the model.   |

Table 2. Previous Literature on Broader Conceptualizations of Use

Prior literature on new conceptualizations generally just developed the initial concept of broader use and did not examine antecedents or consequences of that use. Additionally, these studies were not focused on complex technologies and did not address mindfulness. For example, the most recent study by Burton-Jones and Straub (2006) examined rich use of Microsoft’s Excel spreadsheet application. The current research argues that mindfulness can be used to examine rich use of more complex, integrated systems that require coordination among business functions and processes. Additionally, many of these prior studies on new conceptualizations focused on *individual* performance

as an outcome but since more complex systems integrate business functions, there is a need to examine the contribution that usage has toward the *organization's* performance. Since researchers have suggested that organizational learning may be the missing link between IT and firm performance, the current study examines an individual's contribution toward organizational learning as an outcome variable. I describe organizational learning more fully later in this chapter.

Complex, integrated systems of today also have a social aspect to them since they require coordination among the business functions within an organization. In addition, social aspects can have an impact on organizational learning but researchers are not yet sure what mechanisms can be used to allow that relationship (Wu and Tsai 2005). Therefore, mindful use is examined as a link between social capital and organizational learning since studies have shown a link between social capital and knowledge creating activities (Wu and Tsai 2005) – mindful use can be viewed as a knowledge creating activity. Social capital may influence users to get more out of integrated systems and that can also allow organizations to have the ability to learn from prior knowledge.

Additionally, it is important to study social capital in the context of system use because researchers and practitioners are discovering the major impact it has on work-related behavior and on gaining valuable knowledge-related resources (Nahapiet and Ghoshal 1998; Widen-Wulff and Ginman 2004). Social capital is an imperfectly imitable resource because it has qualities such as tacitness and social complexity (Nahapiet and Ghoshal 1998) and therefore firms can use it to differentiate themselves from others (Barney 1991). Additionally, “information about different social networks can supplement more economy-based explanations of organizational conduct, and

furthermore give more precise predictions about organizational behavior” (Widen-Wulff and Ginman 2004). Despite its importance, social capital has rarely been examined in terms of system use in the post-adoption phase of implementation.

It is also important to study organizational learning as an outcome of post-adoption use since it has been suggested that it may be the missing link between IT and firm performance (Tippins and Sohi, 2003). Systems may not impact the bottom line if they are not used to their full potential and used in a way that can support learning within the organization. Examining social capital and organizational learning as predictors and outcomes of mindful use answers calls for research that examines the mechanisms through which social capital influences organizational learning (Wu and Tsai 2005)

Having discussed previous literature on system use, I now turn to literature on mindfulness which can help develop broader, post-adoption views on system use. Once these views are developed, I then review the literature on social capital theory and organizational learning theory.

## **2.2 Mindfulness**

Since 1890, researchers have argued that there are varying degrees of consciousness as individuals go about their day-to-day activities (James, 1890). Langer (1982, 1989a, 1989b) has since theoretically and empirically developed two prevalent states of consciousness: mindlessness and mindfulness. Mindlessness is described as a type of cognitive functioning where cues from the environment are processed in an automatic and inflexible manner without considering other aspects of these cues (Langer and Piper 1987). Individuals in a mindless state rely on old distinctions and categories, and therefore engage in rigid behavior that is *governed* rather than *guided* by rules.

In a state of mindlessness, information is processed automatically through premature cognitive commitments which are not consciously considered. A premature cognitive commitment is “a commitment that is unwittingly made to the meaning of information and its understood implications” (Langer and Piper 1987, p. 281). Individuals make these commitments when there is no reason given to consider the information more carefully. For example, people are taught by describing objects in absolute terms such as “this is a coat hanger” and therefore, unless they are taught or shown otherwise, they may not mindfully consider other uses for a coat hanger such as a tool to unlock their car. They have a premature cognitive commitment about a coat hanger and what it is used for. To say “this *could* be a coat hanger” would be a more mindful approach to teaching. Additionally, stereotyping is another example of a premature cognitive commitment because an individual is committing to a certain view without having further information. To avoid these premature cognitive commitments is to actively engage in reconstructing the environment and to be aware of new contextual cues that may be consciously controlled or manipulated. This is a type of cognitive functioning known as mindfulness.

Mindfulness theory arises from a need for individuals to explain their relation to their environment. One way to do so is to perceive the surroundings mindfully. In a mindful state, individuals realize that there is not just one explanation for a situation – they realize there can be more than one perspective. Therefore, instead of just selecting a response that corresponds to the current situation, individuals in a mindful state will give meaning to the past and future through their response to the present. Individuals in a

mindful state understand the instability of experience and that it changes based on the moment and the individual.

Researchers have compared mindfulness to intelligence because both are focused on a certain amount of cognitive flexibility. However, intelligence is different from mindfulness in many ways. To start, intelligence theory focuses on an optimal fit between individual and environment whereas mindfulness theory is centered on the notion that individuals can define their relation to their environment in several ways (Brown and Langer 1990).

Some may also argue that mindlessness is the same as habitual or automatic behavior since these concepts are all concerned with the “rigid invariant behavior that occurs with little or no conscious awareness” (Langer 1992, p. 300). However, they are different because repetition is not necessary for mindlessness – mindlessness can result from a single exposure to information because an individual may rely on old mindsets and perspectives. For example, typing the letter “1” over and over eventually becomes habitual or automatic over time but one can still be mindfully aware that the letter “1” can look like a number or a letter at first glance (Langer 1992).

Considering this review of mindfulness, taking a mindful approach to activity involves (a) a continuous creation of new categories, (b) breaking away from automatic behavior, and (c) an implicit awareness of more than one perspective. On the other hand, mindlessness, or lack of mindfulness, is a state in which individuals engage in minimal processing of information that is relevant to current tasks (Langer, 1989). Acting mindlessly means (a) relying on past categories, (b) acting on automatic pilot, (c) precluding attention to new information, and (d) fixating on a single perspective (Fiol and

O'Connor 2003). In terms of systems, being open-minded and flexible means allowing oneself to be open to using more features and being heedful of what others are doing and what information and system capabilities they may need.

Mindfulness theory asserts that acting mindfully can lead to a number of positive consequences such as a greater sensitivity to one's environment, more openness to new information, creation of new categories for structuring perception, and an enhanced awareness of multiple perspectives in problem solving. Empirical evidence in business studies shows that mindfulness is related to creativity, burnout, productivity, and workplace safety (Langer and Moldoveanu, 2000). Mindfulness has also been empirically linked to positive well-being (Brown and Ryan 2003), quality of life, reduced stress (Carlson, Speca, Patel, and Goodey 2003), reduced consumerism (Rosenberg 2004), and discrimination in the face of bandwagons (Fiol and O'Connor 2003). A detailed summary of studies on the benefits of mindfulness and the negative consequences of approaching life mindlessly can be found in Appendix A.

Most of the research to date has been centered on manipulating general mindfulness and examining outcomes such as memory, creativity, longevity, and learning. For example, in a study by Langer and Piper (1987), mindfulness was manipulated by introducing an object in a conditional or non-conditional way by either saying the object "was" a dog's chew toy or "could be" a dog's chew toy. In the mindful learning condition where the object was introduced in a non-conditional way, subjects were able to come up with a creative use for the dog toy when it was needed – they realized that it could be used as an eraser when the researcher pretended to need one.

In a few others studies, children, college students, and the elderly were instructed to notice new things about a task (i.e., be more mindful about the task). Results showed that mindfulness was associated with greater attention to the task, more liking of the task, and improvements in memory (Carson, Shih, Langer 2001; Levy and Langer 1994). In two other experiments, students were asked to either memorize a script word for word (mindless) or make the script their own (mindful). Those who were mindful in their delivery of the speech were viewed as giving a higher quality presentation (Kawakami, White, and Langer 2000) and showed improved retention and creativity (Lieberman and Langer 1997).

Very few studies have examined mindfulness in the context of information systems (IS). One recent conceptual paper described how organizations can be mindful or mindless in their approach to IT innovation (Swanson and Ramiller 2004). This was not an empirical study and was focused on how *organizations* can attend to IT innovations in a mindful way instead of just implementing technology because others are implementing it. In contrast, the current study focuses on how *individuals* can use systems in a mindful way. It also develops two new scales for mindful use and empirically tests a model surrounding mindful use.

### **2.3 Mindfulness in the context of information systems**

As mentioned previously, acting mindfully means (a) a continuous creation of new categories, (b) breaking away from automatic behavior, and (c) an implicit awareness of more than one perspective. Table 3 shows how these are related to the new constructs that are developed in this research.

| MINDFULNESS  | MINDFULNESS IN THE CONTEXT OF IS   |
|--|--|
| a) Continuous creation of new categories           | <p><u>Full appropriation</u> - exploiting applicable features of the system</p> <p><i>Example:</i> Using features of a cell phone which are not common with original telephones (such as text messaging). This shows that the individual is not using premature cognitive commitments about phones in general.</p> |
| b) Breaking away from automatic behavior           | <p>This is not examined in the current research since there is already extensive research on routine use, habitual use, and flow. In some cases, routine (mindless) use can be more productive than mindful use.</p>   |
| c) Implicit awareness of more than one perspective | <p><u>Heedful use</u> – considering the needs of others within the organization when using a system</p> <p><i>Example:</i> Entering detailed information into a help desk troubleshooting database so that others will know what to do if they get a similar call.</p>   |

Table 3. Mindfulness in the Context of IS

The full appropriation dimension of mindful use is related to the “creation of new categories” aspect of general mindfulness and the heedful use dimension of mindful use is related to the “awareness of more than one perspective” aspect of general mindfulness. The remaining aspect, “automatic behavior” is not addressed in the current research since there has been similar research on habitual or routine use and a state of flow with using systems (e.g., Agarwal and Karahanna 2000; Trevino and Webster 1992). In these cases,



use might be considered mindless. The research on habitual use is concerned more with what happens after repetitive use of a system or using the same few features all the time. Alternatively, the current research is focused on a certain point in time in the post-adoption phase where managers can examine how use has emerged. Are employees using the applicable features of the system? Are they considering the “big picture” of how the system can benefit the organization as a whole? It is important for managers to ask these questions in the post-adoption phase to see if systems are being used to their full potential (Jaspersen et al. 2005).

Using more features of a technology, i.e., full appropriation, can apply to all kinds of systems. Any system that has numerous features can provide a greater return if those features are actually used. However, in some cases, certain features may be unnecessary or may take time away from more productive tasks. For example, managers would not want employees to be using the games feature of the Windows operating system. For the current research, I am only focusing on features that are useful to a person’s job and features that are deemed important by management. As mentioned in Table 3, full appropriation is a more mindful approach because it means not having premature cognitive commitments about how the system is used. In many cases, individuals use just the features that are consistent with systems they have used in the past. This can limit what features they will use and a mindful approach means a fuller appropriation of the system’s features. Many complex systems of today require users to break from old mindsets about older, simpler, and more individualized systems and software.

Considering others when using a system, i.e., heedful use, may *not* apply to all systems. Instead, it is more relevant to large, collaborative systems that require

coordination among different people such as knowledge management systems, which will be used for the current research. More individualized systems like PowerPoint do not lend themselves to considering the needs of others. Heeding others is more useful when examining systems where quality information is to be contributed and used by others.

Considering the needs of others when using a knowledge management system means contributing useful information or understanding how certain features of the system may help others. If individuals understand the “big picture” of how the system benefits the organization as a whole they will enter information that others can use and will recognize how others could use certain capabilities of the system.

Since heedful use is centered on the notion of considering *others*, it is important to examine it with a *social* perspective. Since mindful use occurs in the post-adoption phase, it is more likely to be influenced by everyday social interactions as opposed to factors such as initial training. In addition, social capital is gaining prominence as a factor that influences knowledge management and organizational learning (Huysman and Wulf 2004), but research has not yet examined the mechanisms through which social capital has its influence (Wu and Tsai 2005). The current research suggests that full appropriation and heedful use are two mechanisms that can bridge the gap between social capital and organizational learning.

## **2.4 Social Capital and Organizational Learning**

Both social capital and organizational learning are included in the model because studies on organizational learning have emphasized the fact that social capital is necessary for sustained learning and knowledge creation within organizations (Dovey and Singhota 2005). Studies that examine the predictors of organizational learning often

focus on human resource factors such as turnover. However, researchers have recently argued that it is the loss in social capital that comes with turnover that impacts losses in tacit knowledge within the organization (Droege and Hoobler 2003). An organization's ability to learn depends heavily on the availability of social resources (Dovey and Singhota 2005). Additionally, some have argued that social capital can expedite the efficiency of information diffusion by minimizing redundancy (Walker, Kogut, and Shan 1997; Burt 1992). Although the strength of this relationship is well known, there has been a recent call for research that uncovers the mechanisms through which social capital has its influence on knowledge creating activities within the organization (Wu and Tsai 2005).

The current research argues that mindful use of knowledge management systems can bridge the gap between social capital and organizational learning. Knowledge management systems are used to distribute knowledge throughout the organization so that others can access and refer to information from best practices, lessons learned, and previous mistakes. However, knowledge management systems cannot have the positive impact they were designed to provide if users are not approaching them in a mindful way. To get the most out of knowledge management systems users need to actually use the important features of the system and they need to contribute information that is considered useful to others. Just simply using a knowledge management system does not mean organizations that invest in them are getting the expected benefits.

The proposed model (Figure 1) and a review of the literature on social capital and organizational learning follow.

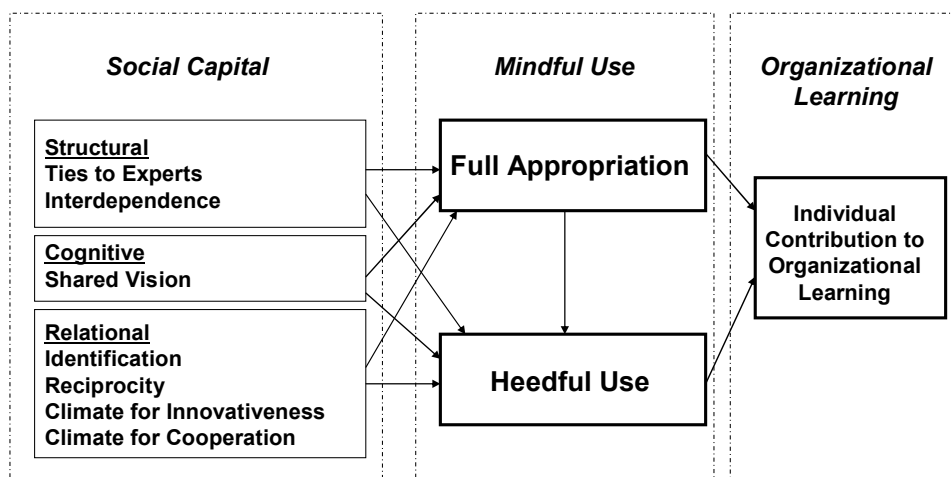


Figure 1. Proposed Model

## 2.5 Social Capital Theory

Economists of the past and present have attested to the importance of capital in various forms. Webster's Dictionary defines capital as "the accumulation of assets, resources, and sources of strength that are used to aid in accomplishing an end or furthering a pursuit." Many forms of capital such as financial capital, physical capital, human capital, market capital, and intellectual capital have been used to assess a firm's value.

More recently, social aspects of capital have gained prominence because researchers and practitioners agree that it has become an important factor for leveraging the use of knowledge within a firm to gain a competitive advantage. Drucker (1994) describes the twenty-first century as the "age of social transformation" and Baker (2000) argues that success in business is achieved through developing and leveraging social capital. Social capital is "network ties of goodwill, mutual support, shared language, shared norms,

social trust, and a sense of mutual obligation that people can derive value from” (Huysman and Wulf 2004, p. 1). It is about relationships and connections with various communities (Putnam 1995b). The central idea behind social capital theory is that social relationships among people are valuable assets that can foster social affairs and access to knowledge (Nahapiet and Ghoshal 1998).

It is also important to study social capital since it is known to be the most valuable form of capital since it (a) is difficult to transfer to other individuals, (b) is difficult to control since efforts to develop relationships can be unsuccessful, (c) is difficult to substitute with other forms of capital (i.e., it is more distinct and less flexible than other forms of capital), (d) requires significant investment to create and maintain, and (e) has the highest potential to create synergy with other forms of capital (Tymon and Stumpf 2003).

The first analysis of social capital has been identified as Bourdieu’s 1986 analysis where he defined it as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” (Portes 1998, p. 248). In other words, he viewed social capital as the wealth of resources we gain from relationships with people. The concept then evolved with work by Coleman (1988) and Burt (1992) and came to be known as the ability of actors to gain benefits by being members of social structures such as networks or communities (Portes 1998). More recently, social capital has been defined as “resources embedded in a social structure that are accessed and/or mobilized in purposive action” (Lin 2001, p. 29). These resources include relationships and ties among individuals in a group, network, or organization.

Some of the first studies on social capital examined its influence on communities. It was found that networks of strong personal relationships were the foundation for trust, collective action, and cooperation (Jacobs 1965). Researchers then examined the influence of social capital on human capital development (Coleman 1988; Loury 1977, 1987) and on the economic performance of firms (Baker 1990) and nations (Fukuyama 1995). In studies such as these, social capital is considered a public good and benefits are examined at the group, community, or organization level. At this level, benefits might also include knowledge management (Hoffman, Hoelscher, and Sherif 2005), reputation, business opportunities, and privileged access to information (Inkpen and Tsang 2005).

On the other hand, when social capital is considered a private good, the benefits are examined at the individual level and might include career advancement, level of compensation, achieved status (Inkpen and Tsang 2005; Timberlake 2005), and child development (Loury 1977). One study found that social capital in the form of network-building and initiative-taking mediated the relationship between proactive personality and job performance (Thompson 2005). In other words, having a large social network positively influenced an individual's propensity to be more proactive in their work environment which was related to higher job performance. Another study found that social capital led to career success through network benefits such as access to information, access to resources, and career sponsorship. Entire books have been devoted to the notion that success can be achieved through social capital (e.g. Baker 2000). Since system use is generally examined at the individual level, that level of analysis is used for the current research.

In the realm of information systems, studies have examined both the relationship that systems have on social capital and the relationship social capital has on the quantity and quality of knowledge shared through computer networks via e-mail and computer-mediated discussion forums. To address the former relationship, some have examined how the internet adds to existing levels of social capital (Quan-Haase and Wellman 2005) and how general technology innovations in organizations can change structural relationships among people (Burkhardt and Brass 1990). In another study of a bookkeeping system, researchers found that IS facilitated social interactions which fostered trust, acceptance, and alignment within a community (Syrjanen and Kuutti 2005).

To address the latter relationship, one study found that more knowledge was shared from those individuals that were more embedded in an electronic network (Wasko and Faraj 2005) and another study found that even weak network ties led to contributions of useful, problem-solving advice (Constant, Sproull, and Kiesler 1996). The influence that social capital has on system use in the post adoption phase has not yet been examined. The current study's emphasis on heedful use differs from knowledge sharing in previous studies because it examines knowledge that is contributed to a formal corporate system such as a knowledge portal that allows the knowledge to be accessed and used again and again. Users can contribute lessons learned, solutions to problems, and best practices so that others may learn from mistakes and successes. Other studies have examined information from discussion forums and e-mail which is not formally stored and accessible to others on a long term basis. Next, I review the literature on organizational learning.

## 2.6 Organizational Learning

A common theme among firms today is the increasing emphasis and value placed on information and knowledge. Information has become an invisible asset that can be used to leverage other firm resources (Bharadwaj 2000; Mata, Fuerst, and Barney 1995) and generating and managing knowledge has become critical for firms wanting to gain and sustain a competitive advantage. It has been argued that knowledge is an organization's most valuable resource because it is intangible and allows for operational routines and creative processes that are difficult to imitate (Grant 1996). In a recent survey assessing the most important issues they face, Fortune 50 CEOs reported 'knowledge management' second only to 'globalization' as a 'must do' action item (Wu and Tsai 2005). Since knowledge management is the "generation, representation, storage, transfer, transformation, application, embedding, and protecting of organizational knowledge" (Schultze and Leidner 2002, p. 218), it goes hand in hand with organizational learning and the two terms have been used synonymously.

In the past few years there has been an increased interest in organizational learning since it has been suggested to have great potential for influencing competitive advantage, organizational control and intelligence, exploitation of knowledge and technology, and other critical organizational outcomes (Templeton, Lewis, and Snyder 2002). Since organizational learning can increase a firm's capacity to take effective action (Kim 1993) and can mobilize tacit knowledge, it can lead to greater firm effectiveness (Barney 1991). Additionally, since many studies still fail to reveal positive outcomes from technology, researchers have suggested that organizational learning may be the missing link between systems and firm performance (Tippins and Sohi, 2003).



After a comprehensive review and content analysis of 78 studies on organizational learning, Templeton, Lewis, and Snyder (2002) came up with the following definition which encompasses the most well known definitions to date:

Organizational learning is the set of actions (knowledge acquisition, information distribution, information interpretation, and organizational memory) within the organization that intentionally and unintentionally influences positive organizational change (p. 189).

Organizational learning theory has roots in many works and disciplines but many would argue that it started with psychologists such as Pavlov (1927) and Skinner (1938) who examined learning at the individual level. Some organizational learning theorists would instead argue that the concept started with cumulative developments of organizational theory. Some of these initial tenets include Adam Smith's (1776) organizational adoption of techniques and technologies and Frederick Taylor's (1911) work on how organizational operations could be objectified and improved. There was also the seminal piece by T.P. Wright (1936) which described outcome patterns associated with collective learning behavior. Some have also suggested that work on bureaucracy (Weber 1995) and organizational functionalism (Fayol 1949) has made significant contributions to organizational learning theory. Although Cyert and March (1963) were first to coin the phrase and establish learning at the organizational level, all of these works have contributed to the need for organizational learning research.

Much of Templeton et al.'s (2002) review was hinged on Huber's (1991) work where he defines learning as information processing which results in changes in behavior. He describes organizational learning as a process where knowledge is acquired, distributed, interpreted based on the organizational context, and stored in an organization's memory (Huber 1991). More detail about these four actions follows.

Huber (1991) suggests that *information acquisition* is made up of five subconstructs or subprocesses: congenital learning, experiential learning, vicarious learning, grafting, and searching or noticing. Congenital learning consists of the knowledge with which an organization or individual starts out; experiential knowledge is that which is gained through experience; vicarious learning is gaining knowledge by observing other people or organizations; grafting is acquiring a resource that already has knowledge and learning from that source, and searching is learning by scanning and monitoring the surrounding environment (Huber 1991). He suggests that all of these variables are critical mechanisms through which important information is gathered. Information can be acquired at the individual level in all the same ways – congenitally, experientially, vicariously, and through grafting and searching.

*Information distribution* is much less complex than information acquisition and hinges on the notion that organizations often do not know what they know. Former Hewlett-Packard CEO Lew Platt once said, “I wish we knew what we knew at HP” and Jerry Junkins, former CEO of Texas Instruments once said, “If TI only knew what TI knows” (O’Dell and Grayson 1998, p. 154). Distributing the knowledge and information that has been acquired aims at teaching the organization’s members what the organization knows. Organizations often have weak systems for finding pertinent information and could likely benefit from a wider distribution of it (Huber 1991). By knowing who knows what and how to get the right information to the right people, information distribution can be accomplished at the individual level.

*Information interpretation* has been described as sharing and incorporating aspects of knowledge to achieve a shared understanding as well as coordination in

decision making (Lopez, Peon, and Ordas 2005). As such, it is sometimes called *shared* interpretation instead of *information* interpretation and Daft and Weick (1984) define it as, “the process of translating events and developing shared understandings and conceptual schemes” (p. 286). Finally, *organizational memory* is defined as an organization’s overall knowledge of facts and events as well as its knowledge of routines, processes, and procedures (Tippins and Sohi 2003). The goal of organizational memory is to store knowledge for future use, either in systems or in the form of rules and procedures (Lopez, Peon, and Ordas 2005). Organizational memories are often lacking because of turnover, unanticipated future needs for information, and limited knowledge about where the appropriate information is stored (Huber 1991).

Past research has shown that information systems can play a significant role in organizational learning. For example, one study suggested that advanced information systems such as executive information systems can facilitate learning that has strategic implications (Stein and Vandebosch 1996). Other studies have found that group decision support systems and desktop videoconferencing can enhance collaborative learning and collaborative telelearning, respectively (Alavi 1994; Alavi, Wheeler, and Valacich 1995). Additionally, Goodman and Darr (1998) examined how certain computer-aided systems facilitated communication, formulating solutions, and creating and updating organizational memory.

For the current research, I examine how an *individual can contribute* to organizational learning. As the definition states, organizational learning is about taking certain actions and individuals can engage in these actions in order to contribute to the overall learning of the organization. For example, to assist in information distribution an

individual can know who knows what and get the right information to the right people. In the same study that reviewed the organizational learning literature, the authors state that, “The research reported herein is based on the view of organizations as a collection of individuals serving as agents that act on behalf of the interests of the firm” (Templeton et al. 2002, p. 208).

The previous sections have summarized the theoretical background and research surrounding system use, mindfulness, mindful use, social capital, and organizational learning. The next chapter provides the justification for the individual hypotheses surrounding the idea that social capital predicts mindful use (i.e., full appropriation and heedful use) and that organizational learning is an outcome of mindful use.

## CHAPTER 3: HYPOTHESIS DEVELOPMENT

### 3.1 The proposed model

This current research attempts to fill gaps in the literature by examining a form of post-adoption use – mindful use – as a link between social capital and organizational learning. This chapter explains how structural, cognitive, and relational aspects of social capital can influence both full appropriation and heedful use, and how these forms of use can foster organizational learning. In different ways each form of social capital relate to both full appropriation and heedful use. However, since full appropriation and heedful use are unique constructs based on different aspects of mindfulness, some of the more specific social capital constructs may relate to full appropriation but not heedful use and vice versa. The model is displayed again in Figure 2.

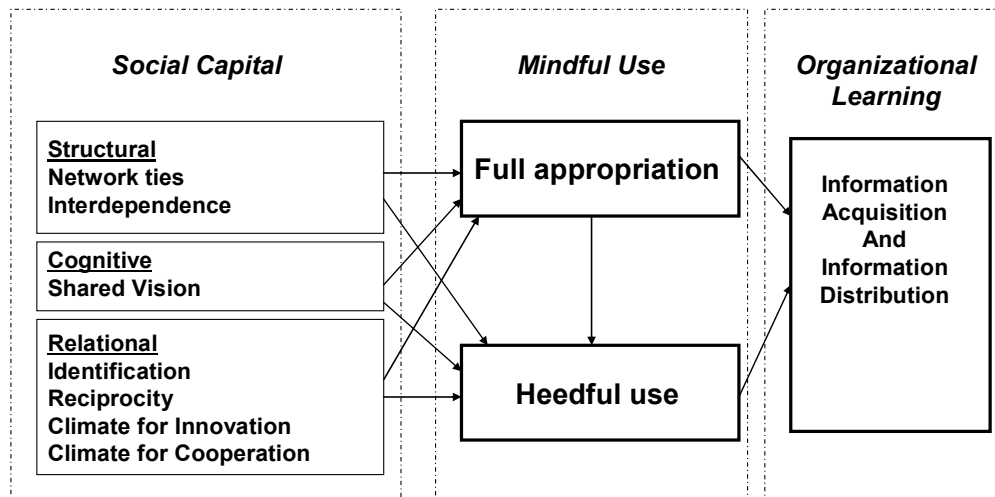


Figure 2. Proposed Model

### 3.2 Predicting mindful use

Individuals can reap great benefits from social capital in the workplace. In the past, social capital has been used to explain pro-social behavior such as collective action (Jacobs 1965), community involvement and differential social achievements (Coleman 1990), knowledge sharing (Wasko and Faraj 2005), and intellectual capital (Nahapiet and Ghoshal 1998). In the same way, social capital theory can be used to explain full appropriation and heedful use.

Nahapiet and Ghoshal (1998) use a framework that breaks social capital down into three dimensions. *Structural capital* refers to links or connections between individuals and includes network ties and relationships within an organization. *Cognitive capital* refers to resources that provide shared representations, interpretations, and systems of meaning among those within a collective (Cicourel 1973). Some researchers examine it in terms of shared language and shared narratives (Nahapiet and Ghoshal 1998) while others examine it in terms of a shared vision or shared culture (Inkpen and Tsang 2005). *Relational capital* refers to the strong, positive characteristics of relationships and includes trust, norms, and organizational identification.

Although Nahapiet and Ghoshal (1998) examine group level social capital, these factors can be examined at the individual level as well. For example, Wasko and Faraj (2005) examined an individual's centrality in a network, an individual's expertise and tenure, and an individual's level of commitment and reciprocity within a network. Since system use is an individual level construct, I examined the social capital variables at that level for the current research.

### 3.2.1 Structural Capital

The next sections describe how structural capital in the form of ties to experts and interdependence relate to full appropriation and heedful use.

#### 3.2.1.1 Ties to Experts

Relational contacts or network ties can facilitate knowledge flow by creating access and motivation to exchange ideas and information (Nahapiet and Ghoshal 1998). With strong social ties, individuals are more likely to share information because there is a mutual bond and they want to help each other out. Having strong social ties to *certain people* can influence full appropriation. In the post-adoption phase, training has already occurred and if certain features are not used right away, employees may lose the knowledge to exploit those features (i.e., “use it or lose it”). These users can therefore turn to other employees within their social network for information about use of the system and its features. If these other employees are considered experts on the system, individuals will use more features of the system because they have access to those more knowledgeable on the system and its features.

Jaspersen et al. (2005) discuss the importance of user-initiated technology learning interventions in the post-adoption phase which include observing others or going to experts for advice. These interventions affect post-adoptive behaviors by influencing technology perceptions as well as an individual’s interpretation of other work system elements (Jaspersen et al. 2005; Orlikowski et al. 1995). If individuals have personal access to system experts, they are more likely to go to these experts for information about the system and its capabilities. Additionally, these “experts” will also be more likely to

go to those within their social network if they discover new features or realize that certain system features are not being used to their full potential. Therefore,

*H1: Ties to system experts will be positively associated with full appropriation*

Although social ties are also linked to heedful use, that discussion is included in the section on identification since strong social ties are a characteristic of social identification.

### **3.2.1.2. Interdependence**

In some cases, an individual's job may not require him or her to use the system heedfully. Task interdependence is the degree to which goal accomplishment requires continuous, mutual collaboration and joint contributions (Steiner 1972). It includes items such as, "I frequently must coordinate my efforts with others", "My own performance is dependent on receiving accurate information from others", and "The way I perform my job has a significant impact on others" (Pearce and Gregerson 1991). If an individual's job requires coordination or a dependency on others, there is more of a reason to use the system in a way that considers how others may need the information. For example, help desk personnel rely on the input from others' troubleshooting calls so they can reduce redundancy in formulating a solution for other customers.

Studies have also shown that task interdependence is a determinant of citizenship behaviors toward one another because interdependent employees realize that co-workers can return the favor (Smith, Organ, and Near 1983). Individuals may use a system heedfully because they realize that this may instigate others to do the same which is more beneficial for those that have greater interdependence. For these reasons,

*H2: Task interdependence will be positively associated with heedful use.*



### 3.2.2 Cognitive Capital

The cognitive dimension of social capital refers to resources available to an individual from having shared expectations, shared goals, and a shared vision that results from employees coordinating actions, making compatible decisions, and interpreting cues in a similar way (Inkpen and Tsang 2005; Levesque, Wilson, and Wholey 2001; Nahapiet and Ghoshal 1998). Shared vision is the only variable that is used here since it “embodies collective goals and aspirations” (Inkpen and Tsai 2005, p. 157). Shared vision can be defined as a common understanding and approach to achieving tasks and outcomes (Inkpen and Tsang 2005). Similar to the research on climate, shared vision can be viewed as molar or specific. For example, researchers can measure a general shared vision about the company when measuring more general outcomes such as job satisfaction or organizational commitment. However, when the outcomes are more specific (e.g., use of a system), evidence suggests it is more useful to have a more specific type of vision such as a shared *system* vision (Ostroff, Kinicki, and Tamkins 2003; Schneider 2000; Schneider and Bowen 1985; Zohar 1980). Although shared vision is often used as a team or group level variable, it has also been used at the individual level in the sense that an individual can perceive a shared vision among employees within the organization (e.g., Lee, Wong, and Chong 2005).

A shared system vision can influence full appropriation because individuals realize that others share their vision of how the system can help the organization reach its goals. Without a shared vision, there is less motivation to use all the important features of a system because there is no common idea about how the system facilitates the organization’s overall outcomes. A shared system vision can also impact heedful use

because individuals with shared meanings can distribute knowledge and ideas more efficiently and effectively (Levesque, Wilson, and Wholey 2001). If there is a shared vision of the goals of the system, then individuals have a better idea of how to use the system in a way that is helpful to others. Without a shared system vision, individuals may have different ideas about what information is important to others and the organization as a whole. Therefore,

*H3: The perception of a shared system vision will be positively associated with full appropriation.*

*H4: The perception of a shared system vision will be positively associated with heedful use.*

### **3.2.3 Relational Capital**

The relational aspect of social capital consists of having a strong identification with the collective (Lewicki and Bunker 1996), having a sense of reciprocity or obligation to contribute to the collective (Coleman 1990), and abiding by the norms of the collective (Putnam 1995a) which are part of that collective's climate. Each of these facets of relational capital is discussed next.

#### **3.2.3.1. Identification**

Social identification is a sense of belonging associated with some human aggregate (Ashforth and Mael 1989) such as a group or organization. This concept stems from social identity theory which states that individuals classify themselves into social categories and that classification helps them answer the question, "Who am I?" (Pierce, Kostova, and Dirks 2001; Stryker and Serpe 1982; Turner 1982). Identification with an organization is what leads individuals to be loyal to the organization and to be motivated to perform well for the organization. For example, researchers suggest that consequences

of identification include support for organization and participation activities, intent to remain, reduced frustration and stress, and less alienation (Pierce et al. 2001). As theories of organizational motivation suggest, identification with the organization or a positive regard for an organization can even substitute for direct incentives in motivating people to help others (Constant, Sproull, Kiesler 1996).

Identification has also been suggested to coexist with psychological ownership which is a feeling of being psychologically tied to an object (Pierce et al. 2000). Psychological ownership has been linked to similar consequences as those of identity but has also been associated with promotion of change, worker integration, burden sharing, becoming informed, and extra-role behaviors such as organizational citizenship behaviors (Pierce et al. 2000). A strong identification increases perceived opportunities for information exchange and can increase the frequency of cooperation (Lewicki and Bunker 1996). When there is weak identification there are barriers to information sharing, learning, and knowledge creation. As suggested in these previous findings, those that identify with their organization are more likely to exhibit extra-role behaviors or proactive behavior that considers others within the organization (e.g., heedful use).

Research on the strength of network ties can also help explain the influence of social identification on heedful use. By definition, social identification subsumes strong ties with others in the organization and empirical evidence suggests that strong ties are associated with a willingness to exchange information (Krackhardt 1992; Smith, Collins, and Clark 2005), knowledge sharing (Wellman and Wortley 1990), cooperating for mutual benefits (Krackhardt 1992), and with a firm's knowledge creation capability (Smith, Collins, and Clark 2005). The stronger the ties, the greater the social

identification which means individuals care about each other and are willing to help each other by entering information that may be useful to them or by letting others know about certain system capabilities.

If individuals strongly identify with the organization and other employees, they have a motivation to work toward a greater good. They are motivated to ensure others get the information and capabilities they need to get the job done. In the case where someone does not identify with the people in the organization or the organization itself, there may be more motivation to just keep information for oneself and not let others get credit for it or benefit from it. Therefore, identification should lead to more proactive use of systems which considers others within the organization (i.e., heedful use).

*H5: Identification will be positively associated with heedful use.*

### **3.2.3.2. Reciprocity**

Nahapiet and Ghoshal (1998) use *trust* and *obligations* as additional aspects of relational capital but since others have described *reciprocity* as an aspect of social *trust* (Wasko and Faraj 2005) and since obligation means “a commitment or duty to undertake some activity in the future” (Nahapiet and Ghoshal 1998), reciprocity is used to represent both trust and obligations. Reciprocity is defined as ... “a sense of mutual indebtedness” (Wasko and Faraj 2005) and means that individuals will engage in helping behavior or knowledge contribution because they expect others to reciprocate (Wasko and Faraj 2005; Shumaker and Brownell 1984).

Empirical evidence suggests that an obligation to an organization motivates individuals to contribute valuable advice (Constant et al. 1996) and that individuals contribute to networks due to a perceived moral obligation to pay back others within that

network (Wasko and Faraj 2005). Evidence also suggests that reciprocity facilitates knowledge sharing (Wasko and Faraj 2005). With a strong sense of reciprocity, there is an understanding that heeding others by contributing helpful information will be reciprocated. It is argued that obligations and expectations influence access to people and a motivation to exchange and combine information (Nahapiet and Ghoshal 1998). If there are expectations that helping someone will be reciprocated, then there is more motivation to help. Therefore, reciprocity will motivate individuals to use systems more heedfully because they know that if they do, others will be motivated to do the same.

*H6: Reciprocity will be positively associated with heedful use.*

### **3.2.3.3 Climate**

The influence of social context on behaviors has been examined in terms of culture as well as climate. However, Dennison (1996) argues that culture is rooted in history, collectively held, and better measured with qualitative means. On the other hand, since climate “refers to a contextual situation at a point in time and its links to the thoughts, feelings, and behaviors of organizational members” (Brock et al. 2005, p. 89), it is temporal, subjective, and more easily captured with quantitative methods (Brock et al. 2005). Therefore, the current research uses climate since it is based on quantitative assessments of the phenomenon. Theory and empirical evidence has shown that climate perceptions are important determinants of work-related behavior (Campbell, Dunnington, Lawler, and Weick 1970; Field and Abelson 1982).

Although many researchers have examined climate at the organizational level, there is ample justification for examining it at the individual level as well (e.g., Brock, Zmud, Kim, and Lee 2005; Carless 2004; Carr, Schmidt, Ford, and DeShon 2003; George

and Bishop 1971; Parker, Baltes, Young, Huff, Altmann, Lacost, and Roberts 2003; Schneider and Hall 1972; Tagiuri 1968). Researchers have also questioned studying climate at the organizational level since often there is not a consensus among organizational members as to what *the* organizational climate is (Guion 1973). At the individual level, climate refers to how organizational environments are perceived and interpreted by their employees (James and James 1989). Individuals cognitively appraise their work environment with respect to work-related values and then reflect on the extent to which organizational characteristics are important to them (James, James, and Ashe 1990). Which characteristics are important can vary significantly from one employee to another so it is useful to examine climate at the individual level.

Climate constructs fall into two categories: molar and specific. Molar climate refers to more broad manifestations of the work environment and should be used when measuring broad criterion variables such as job performance or withdrawal. This type of organizational climate is generally defined in terms of shared employee perceptions about policies and procedures i.e., the way things are done (e.g., Cotton 2004). In this context an “optimal climate” may include things like supportive leadership and clear goals (Cotton and Hart 2003). On the other hand, specific climate refers to more narrow manifestations and should be used when measuring more specific outcomes. For example, researchers should measure a climate for safe behavior if the outcome variable is safe behavior. Empirical evidence supports the idea that specific climates predict specific outcomes (Ostroff, Kinicki, and Tamkins 2003; Schneider 2000; Schneider and Bowen 1985; Zohar 1980). The current research is measuring full appropriation and

heedful use so I examine the extent to which the organization has a climate that supports those behaviors.

The organizational personality construct measure has recently been developed and validated (Slaughter, Zickar, Highhouse, and Mohr 2004) and can help capture a climate that supports full appropriation and heedful use. Organizational personality is defined as the set of personality characteristics *perceived* to be associated with an organization. It does not purport that organizations have personalities but simply states that there are certain personality traits that individuals associate with the organization. It is similar to the marketing concept of brand personality which refers to the fact that consumers associate human characteristics with certain products (Acker 1997). For example, evidence has shown that consumers perceive Coca-Cola as cool and all-American (Pendergrast 1993) and Pepsi as young and exciting (Plummer 1985).

Slaughter et al. (2004) found that five factors capture organizational personality: Boy Scout, Innovativeness, Dominance, Thrift, and Style. I use the Boy Scout and Innovativeness factors here since they exemplify an environment that supports exploratory and cooperative behavior. The Innovativeness factor of organizational personality is made up of items related to being interesting, unique, and creative (Slaughter et al. 2004). An organization perceived as innovative will also be perceived as encouraging innovative, creative, or exploratory use of systems. If individuals perceive their organization as encouraging creativity and innovation, they will feel less threatened when exploring new technologies and trying out new features. Additionally, Langer (1989) states that creativity and mindfulness go hand in hand because in both cases individuals are freeing themselves from existing mindsets and are therefore open to new

information (Langer 1989). Therefore, if individuals perceive a climate for creativity, they will be more mindful in their approach to systems (i.e., full appropriation).

*H7: The perception of an Innovative organizational personality will be positively associated with full appropriation.*

The Boy Scout factor is made up of items related to being attentive to people, family-oriented, cooperative, and helpful (Slaughter et al. 2004). If individuals perceive their organization to fall into this category, they will feel encouraged to be helpful and cooperative – in essence, they are surrounded by a climate that allows them to be cooperative, helpful, and attentive to people which is the general idea behind using a system heedfully. A *cooperative* environment motivates individuals to exchange knowledge with group members and opens access among those group members (Nahapiet and Ghoshal 1998). Research has shown that norms for openness and teamwork allow for loyalty building and disclosure of information (Starbuck 1992). Additional empirical evidence shows that an organizational climate for fairness (or trust), innovativeness, and affiliation (or pro-social norms) has a significant impact on knowledge sharing intentions (Bock et al. 2005).

On the other hand, an atmosphere that encourages competition instead of cooperation will force individuals to keep information to themselves in order to keep their own unique value. Researchers suggest that giving away knowledge can render an individual less valuable because he/she is giving up what makes them unique in relation to others and what they know (Thibaut and Kelley 1959). Giving away information benefits everyone but the person giving it away (Thorn and Connolly 1987). Therefore, there needs to be a motivation for cooperating that counters this motivation to keep information for oneself. A climate for cooperation can be just that motivation. If



individuals perceive a climate for cooperation they will be more motivated to heed others when entering information into a system.

*H8: The perception of a Boy Scout organizational personality will be positively associated with heedful use.*

### **3.3 Full appropriation and Heedful use**

As mentioned previously, full appropriation may apply to all kinds of systems but heedful use will only apply to more collaborative systems such as knowledge management systems. Therefore, to establish the relationship between these two constructs, it is helpful to turn to information about what makes knowledge management systems unique. Knowledge management systems are developed to support and enhance generation, codification, and utilization of knowledge (Alavi 2000). Therefore, if individuals are using more features of a knowledge management system and exploiting its capabilities (i.e., full appropriation); they are accessing more information about the organization and the functions of others. They will have a broader understanding of what others in the organization do and therefore will have a better understanding of how to tailor their input to those individuals.

Additionally, those individuals that use more features of the system will have a better understanding of the capabilities of the system. With this broader understanding, they are better able to determine what information and features of the system might be helpful to others. Therefore, they will be more likely to let others know about the capabilities that may help in their job. Additionally, since both full appropriation and heedful use are conceptually based on mindfulness, I would expect the two to be associated.

*H9: Full appropriation will be positively associated with heedful use for knowledge management systems.*

### **3.4 Outcomes of mindful use**

Early theories suggested that IT was linked to competitive advantage and firm performance (Porter 1985; Porter and Millar 1985; Rackoff, Wiseman, and Ullrich 1985) yet current empirical work fails to show a direct relationship between IT and competitive advantage or IT and firm performance (e.g., Mahmood and Soon 1991; Zahra and Covin 1993; Hitt and Brynjolfsson 1996; Powell and Dent-Micallef 1997). It has been suggested that a focus on knowledge and organizational learning can be the missing link between IT and firm performance (Tippins and Sohi 2003).

Organizational learning may be the missing link because it can play a key role in enhancing a firm's capabilities and competitive advantage (e.g., Grant 1996; Simonin 1997). Researchers argue that IT must be complemented with organizational learning processes in order to be successful (Anand, Manz, and Glick 1998) but empirical work is lacking in this area (Tippins and Sohi 2003). One empirical study of managers from 271 manufacturing firms found that organizational learning mediated the relationship between IT capability and firm performance where IT capability consisted of IT knowledge, IT operations, and IT objects and firm performance was measured with customer retention, sales growth, profitability, and return on investment (Tippins and Sohi 2003). Another study of 195 Spanish firms provided support for the idea that organizational learning is positively associated with innovation, competitiveness, and economic/financial results (Lopez, Peon, and Ordas 2005). The current research expands the research in this area and asserts that full appropriation and heedful use are ways to leverage IT for organizational learning.

The current research uses an individual level of analysis and organizational learning is generally considered an organization-level construct. Therefore, an *individual's contribution* to organizational learning is used for this framework. Additionally, since heedful use only applies to systems such as knowledge management systems, the dependent variable will be described in terms of these systems. As mentioned previously, organizational learning is “the set of actions (knowledge acquisition, information distribution, information interpretation, and organizational memory) within the organization that intentionally and unintentionally influence positive organizational change” (Templeton, Lewis, and Snyder 2002). Next, I discuss how full appropriation and heedful use can influence an individual's contribution to organizational learning.

Templeton et al. (2002) suggest that awareness and environmental adaptability are important dimensions of organizational learning. Since knowledge management systems are developed to support and enhance generation, codification, and utilization of knowledge (Alavi 2000), a fuller appropriation of the features of a knowledge management system can allow an individual to be more aware of their environment and therefore, be more ready to adapt to that environment. Additionally, those that seek out information in a knowledge management system are the same individuals that are likely to seek out information in other ways so using more features can allow an individual to be more aware of his or her environment and adapt to that environment appropriately.

In terms of heedful use, individuals that contribute useful and understandable information through the system are more likely to do the same by other means. Also, if systems are used more heedfully, the information is of higher quality and therefore more

likely to be distributed and re-used. If an individual knows they are contributing information that will be useful to others, they will ensure that information is distributed to the right people. This information will be useful to others and therefore more likely to be remembered, used again, and distributed to others that may need the information. Additionally, individuals that contribute helpful information are also more likely to distribute information because they assume others will do the same. If an individual wants to help others by contributing useful information, he/she will also want to help others by making sure that information gets to the right people. Heedful use allows organizations to learn because information such as lessons learned and best practices are stored where individuals can use it which can eliminate redundancies and unnecessary mistakes.

Additionally, organizational learning includes the process of exploiting or transforming internally-stored knowledge (Garud and Nayyar 1994) to increase the strategic assets of the firm (Lumpkin and Lichtenstein 2005). In this sense, heedful use can create the first steps to creating valuable “internally-stored knowledge” that will lead to organizational learning since heedful use is not only about sharing knowledge but also about sharing quality knowledge that others can use. Heedful use is more than just contributing quality knowledge. It is about contributing information into a system that is useful to others and allows for repeated access to that information. It is possible to have high quality information that is not useful to others. For example, you could contribute lessons learned from developing a new system. If there is no need for a similar system in the future, the information may be of high quality but not useful to anyone else for future use.

Other studies on knowledge sharing have examined the contribution of knowledge through e-mails and discussion forums instead of formal, organized, and permanent forms that occur with knowledge management systems. Information that results from heedful use is more likely to be distributed than quality information because it has the added benefit of helping others. Heedful use is also different from heedful knowledge sharing because it has the added benefit of contributing that information into a system, through use, which allows it to be re-accessed and stored long-term.

*H10: Full appropriation will be positively associated with an individual's contribution to organizational learning.*

*H11: Heedful use will be positively associated with an individual's contribution to organizational learning.*

Figure 3 shows how the relationships are associated with each hypothesis. Table 4 lists the hypotheses.

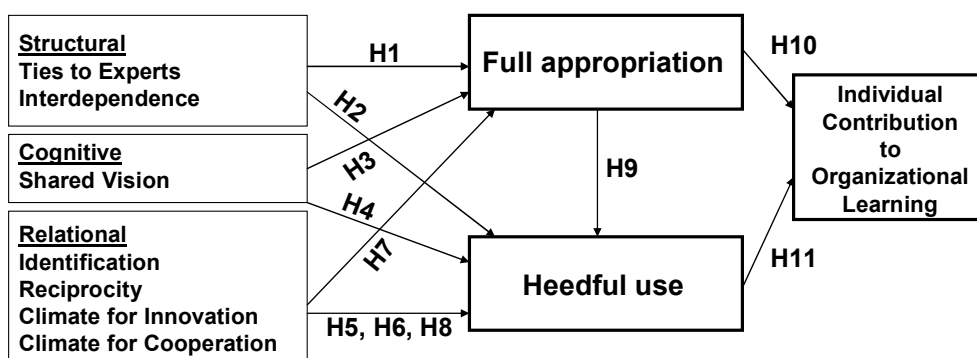


Figure 3. Proposed Model with Hypotheses

|            |   |
|------------|---|
| <b>H1</b>  | Ties to system experts will be positively associated with full appropriation.                                     |
| <b>H2</b>  | Task interdependence will be positively associated with heedful use.  |
| <b>H3</b>  | The perception of a shared system vision will be positively associated with full appropriation.                   |
| <b>H4</b>  | The perception of a shared system vision will be positively associated with heedful use.                          |
| <b>H5</b>  | Identification will be positively associated with heedful use.  |
| <b>H6</b>  | Reciprocity will be positively associated with heedful use.   |
| <b>H7</b>  | The perception of an Innovative organizational personality will be positively associated with full appropriation. |
| <b>H8</b>  | The perception of a Boy Scout organizational personality will be positively associated with heedful use.          |
| <b>H9</b>  | Full appropriation will be positively associated with heedful use for knowledge management systems.               |
| <b>H10</b> | Full appropriation will be positively associated with an individual's contribution to organizational learning     |
| <b>H11</b> | Heedful use will be positively associated with an individual's contribution to organizational learning            |

Table 4. List of Hypotheses

To summarize, structural, cognitive, and relational forms of social capital are expected to influence the two dimensions of mindful use: full appropriation and heedful use. Full appropriation should also influence heedful use and both forms of mindful use are expected to influence an individual's contribution to organizational learning. This model and the associated hypotheses develop two new types of system use in the post-adoption phase and propose that social capital may predict mindful use and organizational learning may serve as an outcome to mindful use.

## CHAPTER 4: METHODOLOGY

I conducted two survey-based field studies to test the proposed model and hypotheses. The surveys included pre-existing scales for most constructs and newly developed scale items for full appropriation and heedful use. I discuss the scale development of these items later in the chapter. In the second study, I used ratings from employee supervisors to capture the outcome variable in order to reduce common method bias. For the first study however, it was not possible to obtain supervisor data so I collected the outcome variable data from the subjects themselves. However, Harmon's one factor test provided support for a lack of common method variance. I describe the results of this test in the discussion for study one. Web-based surveys were used since they reduce participation costs (Couper 2001; Read 1991), speed up data collection, do not seem to create response bias (Boyer, Olson, Calantone, and Jackson 2002), and are becoming more widely accepted in the IS field (Bhattacharjee 2001). Descriptions of the samples, the systems, and the measures for each study follow.

### 4.1 The Sample and the System - Study 1

The sample for the first study consisted of employees from a large international non-profit organization focused on providing career services for disadvantaged individuals. This company was a non-profit with a non-technical focus. This company has 205 member organizations spread among 24 countries worldwide. The organization provided 4,700 e-mail addresses but could not guarantee that all of those addresses were attached to working e-mail accounts. The e-mail addresses came from a list of users registered with the system. Approximately 2,000 addresses were not working or belonged to individuals who were "out of the office." Out of the remaining 2,700 users,

510 individuals provided full responses to the web based survey to yield a response rate of 19%.

The system was a web portal that serves as a central, online communications system that connects more than 80,000 employees worldwide. After implementing this system, the organization won a national award for using IT in a way that enabled growth and competitive advantage. This open-source system connects the 205 agencies within the organization and allows employees to share emerging trends and best practices. Employees can interact online and in real time with tools such as blogs, message boards, collaborative chat, and a document management system. Training on this system was not mandatory but it does contain certain training tools for the users. These include online training sessions and online help files. Training was included as a control in this study since it was not mandatory for all users.

#### **4.2 The Sample and the System - Study 2**

The sample for this study consisted of employees of a multi-national software company headquartered near Boston, MA. The company consists of 2,200 employees distributed among 20 different countries. 81 of the 120 users surveyed provided full responses. This response rate of 68% is the highest the company has seen for a global survey. Supervisors of all 81 respondents were asked to rate their employees on contribution to organizational learning but only 51 ratings were obtained. In a few cases, a co-worker rated the subject instead of a supervisor.

The system was a knowledgebase – a repository of solutions connected to known system issues. It allows agents to solve system problems by associating language queries with existing solutions. Designers hope the system will allow for *consistent* resolutions



to problems and a centralized repository. The system allows users to reduce time to resolve issues and allows knowledge gained through experience to be shared throughout the company. Additionally, since it is linked to a case tracking system, it allows company agents to have the option of either creating solutions or quickly locating previously used fixes. The nature of this system lends itself well to organizational learning as long as employees use it mindfully since people can access and distribute previously learned solutions to system problems. Training on this system was mandatory for all employees.

### **4.3 Measures - Studies 1 and 2**

#### **4.3.1 Antecedents to mindful use**

Appendix C contains a comprehensive list of all scale items. The antecedent variables representing social capital were captured using existing measures and validated scales. Constant, Sproull, and Kiesler (1996) measured strength of network ties by asking the information provider how well they knew the information seeker on a 10-point scale (1 = “don’t know at all”, 10 = “know very well”). For the current study, I asked individuals how well they knew individuals that were considered experts on the system. This assesses the strength of ties they have with system experts. The subjects were also asked the extent to which they feel they have easy access to these experts.<sup>1</sup> The task interdependence items were taken from Pearce and Gregerson (1991) and include items such as, “I frequently must coordinate my efforts with others.” The shared system vision items were adapted from Lee et al. 2005, Tippins and Sohi 2003, Tsai and Ghoshal 1998, and Young-Ybarra and Wiersema 1999.

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<sup>1</sup> This is similar to the measure of facilitating conditions but is more specific to having access to system experts as opposed to having access to people and resources in general.

The Boy Scout and Innovative personality measures were adapted from Slaughter et al. (2004) and asked individuals to indicate what level the organization encompasses certain traits such as “Friendly”, “Cooperative”, “Creative”, and “Original”. Reciprocity items were adopted from Constant et al. (1996) and included items such as, “I trust that someone would help me if I were in a similar situation.” The identification measures were adapted from Mael and Ashforth, 1992; Tyler and DeGoey, 1995; Shamir, Zakay, Breinin, and Popper, 1998 and include items such as, “This organization’s successes are my successes”.

#### **4.3.2 Mindful use scale development**

Since full appropriation and heedful use are new constructs, I developed scales using steps from DeVillis (1991). His eight steps include (a) determine clearly what it is you want to measure, (b) generate an item pool, (c) determine the format for measurement, (d) have an initial item pool reviewed by experts, (e) consider inclusion of validation items, (f) administer items to a development sample, (g) evaluate the items, and (h) optimize scale length. I describe the work accomplished for each of these steps next.

From the start, I wanted to develop a measure that captured use of a system to its full potential. This meant using a system’s features as well as using a system in a way that considers others and the “big picture” of how the system is used within the organization. This is similar to the concept of an individual’s general mindfulness and the concept of heedful interrelating. Therefore, I developed some items based on many different definitions, descriptions, and measures for these two concepts (i.e., Langer 1989; Weick et al. 1999; Weick and Sutcliffe 2001). Appendix B lists scale items for

general mindfulness. I chose a Likert scale for the format because this is the type that is often used for opinions, beliefs, and attitudes (DeVillis 1991). Next, the initial item pool was reviewed by experts on mindfulness from the Industrial and Organizational Psychology department and experts on system use in the Information Systems department at a large mid-Atlantic university. I deleted a few items based on their recommendations.

I included validation items in the cluster analysis as well as in the pre-test which I will describe later. I wanted to ensure mindful use was different from similar constructs. Therefore, the first card sorting exercise consisted of the 17 created items for mindful use plus items from similar constructs such as individual mindfulness and personal innovativeness in the domain of IT. The card sorting exercises were accomplished using CardZort software developed by Jorge Toro (<http://condor.depaul.edu/~jtoro/cardzort/cardzort.htm>, 2003). I analyzed the results from the first card sorting exercise using average linkage cluster analysis. Average linkage captures the minimum average distance between an individual or all cluster members and another individual or all cluster members. Average linkage is preferred over single linkage or complete linkage because validation research has found that this method produces superior cluster recovery (Blashfield 1976; Kuiper and Fisher 1975) and satisfies certain recommended algorithmic properties (e.g., Kaufman and Rousseeuw 1990).

Based on the analysis, I deleted a few more mindful use items. I ran a second card sorting exercise using mainly system-related constructs as well as social and organizational identification items. Again, I used average linkage cluster analysis on the card sorting data and most items grouped into the appropriate clusters. One exception

was that social and organizational identification items grouped together which is not surprising.

Based on the results of these two card sorting exercises, I reduced the mindful use scale to 9 items – 3 items which capture full appropriation of systems and 6 items which capture heedful use of systems. After the pre-test and further expert analysis described in Appendix D, I included three more items for full appropriation. All of the items are listed in Table 5.

| MINDFUL USE        |   |
|--------------------|---|
| Full appropriation | I use the system to its full potential  |
|                    | I use all the features of the system that I possibly can                                      |
|                    | I could use more features of the system but I don't   |
|                    | I like to investigate things within the system  |
|                    | I seek to learn new things about the system   |
|                    | I try to think of new ways of doing things with the system                                    |
| Heedful use        | My use of the system is focused on my job, not the jobs of others                             |
|                    | I consider how others are influenced by my use of the system                                  |
|                    | When I use the system, I consider how others may need the information                         |
|                    | I tailor the information I enter into the system to others in the organization                |
|                    | When I use the system, I am aware of more than just my own perspective                        |
|                    | When I use the system, I consider how other business functions depend on my business function |

Table 5. Scale items for mindful use

Since the scales for both full appropriation and heedful use were newly developed, I included alternative measures for each. For study one and two the alternate measures for full appropriation involved asking managers to rate the importance of certain features within the knowledge management system. I then asked users the extent to which they use each of those features. I then had a full appropriation score for each individual based on that data. I also included “Didn't know existed” as a possible answer since someone can think they are using all the features if they do not know certain features exist. Also, by having the alternate measure listed first on the survey, users were

informed of what features are part of the system and could better evaluate their full appropriation of the system.

I should note that Jaspersen et al. (2005) discuss four challenges that researchers should address if they are going to capture data at the feature level. First, the researcher needs to decide whether he/she will measure core features of the technology or ancillary features. I focused on the core features since those represent the technology as a whole (Griffith 1999) but I address the measurement of only those features that are unique to the specific system in the limitations and future research section. Second, the researcher should decide if he/she is going to examine features from the perspective of the designer or the user. I examined the list of features given by the designer since it was consistent across users and contexts. Third, it is important to specify whether the features will be discrete or bundles of features. For example, the bundle “Generate financial statements” can be broken down into discrete features such as “Generate balance sheet” and “Generate income statement”. To limit the length of surveys for the users and supervisors, I used bundles and in some cases I used discrete features that were not part of a bundle. Finally, they suggest choosing between existing versus new instrumentation. As mentioned, I developed new ways to measure full appropriation but used existing scales on mindfulness as a guide.

I obtained the alternate measure of heedful use only in study two because of the nature of the systems. The system for study two tracks how often an agent’s solutions are used. The more often a solution is used, the more helpful that solution is. Therefore, controlling for frequency of problem occurrence, this number gives an estimate of

helpfulness of individual's contribution. If that contribution is helpful then that individual considered the needs of others when entering that information.

I conducted a pre-test to assess the construct validity of full appropriation. Unfortunately, since the pre-test involved students, I was not able to assess heedful use since the students did not use a knowledge management system. However, I did assess reliability and validity of heedful use with the data from the two field studies. Appendix D shows the results of the pre-test which also compared full appropriation of four different types of systems: mobile devices, the Internet, software (such as Word and PowerPoint), and a course management tool. The results of the pre-test found support for the reliability and validity of the newly developed full appropriation scale. It also showed that the perceptions that were significant varied from system to system.

Similar to the pre-test mentioned in Appendix D, I used Cronbach's alpha and factor analyses to assess the reliability and construct validity of full appropriation and heedful use given the data from study one described later. Cronbach's alpha was .83 for full appropriation and .90 for heedful use which indicates highly reliable scales. Cronbach's alpha for full appropriation with all six items was .74 and increased to .83 without item 3 so since that item had caused problems during the pre-test as well, it was eliminated. Item 1 caused some problems with heedful use and it was the only reverse-scored item so it may have caused confusion and was eliminated from the item set. This increased the alpha from .84 to .90.

I again factor analyzed full appropriation with personal innovativeness as a related but unique construct (as in Appendix D). Heedful use was factor analyzed with helpfulness. Helpfulness is a trait related to helping others but is unique from heedful use

since it is not a behavior and is not in the domain of information systems. Table 6 displays the results of the factor analyses and shows evidence of convergent and divergent validity. The full appropriation items have loadings above .60 on the first component and the personal innovativeness items have loadings above .60 on the second component. For the second factor analysis, the heedful use items have loadings above .60 on the first component and the helpfulness items have loadings above .60 on the second component.

|                     | <b>Component</b> |            |
|---------------------|------------------|------------|
|                     | <b>1</b>         | <b>2</b>   |
| Full Appropriation1 | <b>.68</b>       | .01        |
| Full Appropriation2 | <b>.83</b>       | .04        |
| Full Appropriation4 | <b>.76</b>       | .15        |
| Full Appropriation5 | <b>.84</b>       | .21        |
| Full Appropriation6 | <b>.77</b>       | .24        |
| PIIT1               | .19              | <b>.89</b> |
| PIIT2               | .09              | <b>.89</b> |
| PIIT3               | .12              | <b>.93</b> |

|              | <b>Component</b> |            |
|--------------|------------------|------------|
|              | <b>1</b>         | <b>2</b>   |
| Heedful Use2 | <b>.75</b>       | .32        |
| Heedful Use3 | <b>.87</b>       | .20        |
| Heedful Use4 | <b>.85</b>       | -.03       |
| Heedful Use5 | <b>.89</b>       | .01        |
| Heedful Use6 | <b>.82</b>       | .28        |
| Helpfulness1 | .19              | <b>.86</b> |
| Helpfulness2 | .09              | <b>.90</b> |
| Helpfulness3 | .11              | <b>.88</b> |

Table 6. Factor analysis to show Convergent and Divergent validity of Full appropriation and Heedful Use

The Eigen values for the full appropriation and innovativeness factors were 3.74 and 1.91 and the variance explained was 47% for the first factor and 24% for the second factor. The Eigen values for the heedful use and helpfulness factors were 4.15 and 1.95

with variance explained of 52% and 24% respectively. Eigen values above one reveal unique factors and the variance explained was fairly high for each factor indicating support for the items measuring what they were designed to measure. I also factor analyzed full appropriation and heedful use to make sure they were distinct constructs. Table 7 shows the results of this analysis from the data sets from both studies. This analysis lends support for the construct validity of the newly developed scales for full appropriation and heedful use. It shows they are differentiated from each other as well as from similar constructs.

| <b>Study 1</b>      | <b>Component</b> |            |
|---------------------|------------------|------------|
|                     | <b>1</b>         | <b>2</b>   |
| Full Appropriation1 | .07              | <b>.66</b> |
| Full Appropriation2 | .10              | <b>.81</b> |
| Full Appropriation3 | .27              | <b>.72</b> |
| Full Appropriation4 | .16              | <b>.86</b> |
| Full Appropriation5 | .23              | <b>.78</b> |
| Heedful Use1        | <b>.73</b>       | .33        |
| Heedful Use2        | <b>.86</b>       | .25        |
| Heedful Use3        | <b>.85</b>       | .04        |
| Heedful Use4        | <b>.89</b>       | .04        |
| Heedful Use5        | <b>.80</b>       | .33        |
| <b>Study 2</b>      | <b>Component</b> |            |
|                     | <b>1</b>         | <b>2</b>   |
| Full Appropriation1 | <b>.81</b>       | .12        |
| Full Appropriation2 | <b>.84</b>       | .05        |
| Full Appropriation4 | <b>.71</b>       | .31        |
| Full Appropriation5 | <b>.77</b>       | .37        |
| Full Appropriation6 | <b>.74</b>       | .38        |
| Heedful Use1        | .47              | <b>.55</b> |
| Heedful Use2        | .15              | <b>.83</b> |
| Heedful Use3        | .20              | <b>.82</b> |
| Heedful Use4        | .22              | <b>.78</b> |
| Heedful Use5        | .23              | <b>.79</b> |

Table 7. Factor Analysis for Full Appropriation and Heedful Use



### 4.3.3 Organizational Learning

Templeton et al. (2002) conducted a rigorous assessment of content validity, construct validity, internal validity, external validity, and reliability of existing organizational learning measures. I used a subset of the final items developed from their study to assess an individual's contribution to organizational learning. In many cases the items did not make sense at the individual level. The final items used were:<sup>2</sup>

1. Employee X resists changing to new ways of doing things
2. Employee X learns about the company's recent developments through informal means
3. Employee X retrieves archived information when making decisions
4. Employee X is keenly aware of where his/her knowledge can serve the company
5. Employee X keeps information (such as, numbers, plans, ideas) away from other employees
6. When employee X needs specific information, he/she knows who will have it

### 4.3.4 Controls

I used some demographic variables such as age and gender as control variables since they sometimes influence the rate of acceptance and general use of systems (see Venkatesh et al. 2003). I also used line speed as a control since slow system access may eliminate any intentions to use the system more mindfully. Additionally, I captured location in study one since the numerous country offices had varying degrees of system access due to cultural differences or limited system capabilities. I measured job position as a control in study one and unit and level in the organization in study two since mindful use may depend on what your job tasks demand of the system.

Human capital was also included as a control because in the past, when researchers have measured cognitive social capital at the individual level, they have

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<sup>2</sup> All six items were given to supervisors of the subjects in study one and a subset of four items were given to users in study two. Two items were eliminated for study two because of the results from the factor analysis in study one.

operationalized it as tenure and expertise (Wasko and Faraj 2005). These variables are more consistent with human capital which consists of skills, experience, and knowledge (Becker 1964). Human capital theory argues that more training, education, and work experience translates to skills and knowledge needed to be productive (Becker 1964, Borjas 1996). I measured human capital with computer experience, KMS experience, business knowledge, and tenure. Computer experience and KMS experience are specific to the system and should be associated with using more features. On the other hand, business knowledge and tenure are specific to knowledge of the ongoing processes and functions within the organization and should therefore be more related to heedful use. A more detailed description of these relationships follows.

In terms of computer experience, I expected that varying levels of general experience with computers would influence how users interact with and use a system. On one hand, those with more experience may know how to use more features of a system. On the other hand, more experience with previous systems can also mean more premature cognitive commitments about systems in general and this may cause more mindless use of more current systems (i.e., using the same few features all the time). Novelty can evoke mindfulness (Langer and Bayliss 1991) so if a system is considered novel to a novice, then they may be more mindful in their approach to using the system. I measured computer experience by asking subjects how long they had been using computers. KMS experience should lead to a greater understanding of the features and capabilities of the system and therefore, fuller appropriation. I also asked subjects how long they had been using the KMS.

Business knowledge was included because it is an important part of human capital and some researchers suggest that it should relate to more extensive and exploratory use of systems (Sousa & Goodhue 2003). Business knowledge is an understanding of the processes of the organization. It “makes users aware of the impact of local changes on others’ jobs and allows them to identify opportunities in their work practices to increase their performance” (Sousa and Goodhue 2003). An understanding of what others do and how the business processes overlap can give an individual a more holistic view of how the organization runs and how other individuals can benefit from certain information or features of the system. In essence, knowledge of the organization as a whole can lead an individual to contribute more heedfully when using and interacting with a system. The business knowledge items were adapted from Ryan (1991) and asked individuals to rate their level of knowledge on a scale of 1 to 5 for certain statements such as, “Knowledge about the primary functions of the organization.” (1 = Extremely low, 5 = Extremely high).

Tenure should also have a positive influence on heedful use because those with longer tenure are more likely to see how their expertise is relevant and therefore better able to share applicable knowledge with others (Wasko and Faraj 2005). I captured tenure by asking subjects the number of months/years they had been with the organization.

#### **4.4 Analysis**

I first obtained reliabilities and factor loadings using factor analysis to assess the validity of the new scales for full appropriation and heedful use. Next, I used structural equation modeling (SEM) with EQS 6.1 to assess the validity of the full model for study

one. Structural equation modeling simultaneously assesses the measurement model and structural model (Bollen 1989). The measurement model examines links between the indicators and latent constructs and the structural model examines the paths within the hypothesized framework (Bollen 1989). For the measurement model, the psychometric properties of the scales were evaluated with confirmatory factor analysis which provides item loadings, discriminant validity, and internal consistency. Acceptable internal consistencies and item loadings are anything greater than .70. Acceptable discriminant validity occurs when indicators load more strongly on their construct than other constructs in the model (Chin 1998). Next, I examined the structural model using path coefficients and explained variance. The paths of the structural model are interpreted as beta weights in a regression analysis (Agarwal and Karahanna 2000).

Results of the SEM analysis show whether or not the relationships in the model are significant and how much variance the predictors explain in the outcome variables. In other words, it shows if there is a significant relationship between social capital and full appropriation, social capital and heedful use, full appropriation and heedful use, full appropriation and individual contribution to organizational learning, and finally, heedful use and individual contribution to organizational learning. Since study two had such a small sample size, I used regression instead of structural equation modeling. Regression still provides explained variance in the outcome variables as well as beta weights to assess the individual relationships in the model. I also eliminated some variables based on the results of study one to ensure adequate degrees of freedom for such a small sample. Additionally, the measurement model for study one and the factor analysis for

study two support the validity of the two newly developed scales for full appropriation and heedful use. I discuss these results further in chapter 5.

## CHAPTER 5: RESULTS AND DISCUSSION

### 5.1 Results - Study 1

#### 5.1.1 Demographics

The average age of the respondents was 45 years old and 68% were females. The majority of respondents, 48%, were in administrative positions while the rest were distributed among retail (12%), workforce (32%), and contractor (3%). In terms of organizational level, 42% of the respondents were professionals, 25% were managers, 20% were directors, and 13% were VPs. 67% had worked for the company for more than 3 years. 68% of respondents indicated they had Broadband Internet at work, 28% were not sure of their Internet speed, and 96% had been using computers for more than 5 years.

#### 5.1.2 Validity and Model Assessment

I used Cronbach's alpha and structural equation modeling techniques to assess reliabilities, construct validity, and model fit. Table 8 shows the means, standard deviations, reliabilities, and correlations among all the model constructs for study one.

| Construct                  | Mean | s.d. | Alpha | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |
|----------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.Ties                     | 3.89 | 1.39 | .70   | 1     |       |       |       |       |       |       |       |       |
| 2.Interdependence          | 5.86 | 1.06 | .87   | .06   | 1     |       |       |       |       |       |       |       |
| 3.Shared Vision            | 4.21 | 1.11 | .80   | .41** | .05   | 1     |       |       |       |       |       |       |
| 4.Reciprocity              | 6.13 | .82  | .79   | .19** | .13** | .23** | 1     |       |       |       |       |       |
| 5.Identification           | 6.03 | .89  | .84   | .15** | .25** | .17** | .51** | 1     |       |       |       |       |
| 6.Boy Scout                | 5.59 | 1.19 | .93   | .23** | .00   | .26** | .44** | .36** | 1     |       |       |       |
| 7.Innovative               | 5.40 | 1.28 | .91   | .19** | -.03  | .20** | .43** | .35** | .74** | 1     |       |       |
| 8.Full Appropriation       | 3.60 | 1.22 | .87   | .44** | -.04  | .37** | .10*  | .09*  | .21** | .18** | 1     |       |
| 9.Heedful Use              | 4.31 | 1.18 | .86   | .46** | .04   | .37** | .14** | .21** | .20** | .13** | .57** | 1     |
| 10.Organizational Learning | 6.06 | .68  | .60   | .20** | .25** | .10*  | .35** | .37** | .17** | .20** | .12*  | .28** |

Table 8. Descriptives, reliabilities, and correlations

Most of the alphas were above .70 indicating high reliability of scales. This is especially notable for full appropriation and heedful use since they are new constructs. The alternate measure of full appropriation was significantly correlated with the initial

measure and produced similar results as those mentioned below. Organizational learning had the lowest reliability but .60 is still considered acceptable and the items were taken from well-established, validated scales.

I next assessed the convergent and divergent validities of the model constructs using the measurement model of the structural equation modeling procedure. As indicated in Table 9, most of the constructs loaded on their own separate factor with the exception of Boy Scout Organizational Personality and Innovative Organizational Personality. Therefore, I combined these two constructs to form a general climate construct. One other issue was that item one for an individual's contribution to Organizational Learning did not load with the other Organizational Learning items. This is not surprising given the fact that in some studies organizational learning is broken down into 4 factors (information acquisition, information distribution, shared interpretation, and organizational memory) and in other studies it is broken down into eight factors (Awareness, Communication, Performance Assessment, Intellectual Cultivation, Environmental Adaptability, Social Learning, Intellectual Capital Management, and Organizational Grafting). I chose the items that could easily convert to the individual level.

Since the measures for the independent and dependent variable were included on the same survey given to the subjects, I used Harmon's one factor test to check for common method variance. According to this test, if a factor analysis of all the items in an instrument does not produce one dominant factor, then common method variance does not overshadow variance from other sources. Table 9 shows the results from the factor

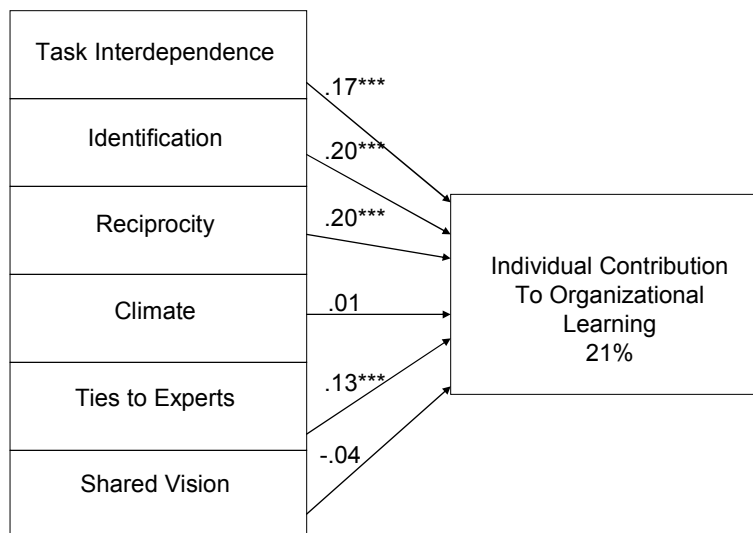
analysis portion of the structural equation modeling approach (i.e., measurement model) and the items loaded on separate factors.

| <b>Factor 1</b> |     | <b>Factor 2</b> |     | <b>Factor 3</b> |     | <b>Factor 4</b> |     | <b>Factor 5</b>  |     |
|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|-----|------------------|-----|
| BS1             | .84 | FA1             | .74 | HU1             | .54 | Inter1          | .84 | Ident1           | .80 |
| BS2             | .74 | FA2             | .78 | HU2             | .82 | Inter2          | .91 | Ident2           | .85 |
| BS3             | .86 | FA3             | .72 | HU3             | .80 | Inter3          | .87 | Ident3           | .72 |
| BS4             | .86 | FA4             | .78 | HU4             | .75 |                 |     |                  |     |
| INN1            | .84 | FA5             | .76 | HU5             | .75 |                 |     |                  |     |
| INN2            | .84 |                 |     |                 |     |                 |     |                  |     |
| INN3            | .78 |                 |     |                 |     |                 |     |                  |     |
| INN4            | .81 |                 |     |                 |     |                 |     |                  |     |
| <b>Factor 6</b> |     | <b>Factor 7</b> |     | <b>Factor 8</b> |     | <b>Factor 9</b> |     | <b>Factor 10</b> |     |
| OL2             | .58 | Syvis1          | .85 | Ties1           | .76 | Recip1          | .70 | OL1              | .62 |
| OL3             | .71 | Syvis2          | .84 | Ties2           | .73 | Recip2          | .78 |                  |     |
| OL4             | .73 |                 |     |                 |     |                 |     |                  |     |
|                 |     |                 |     |                 |     |                 |     |                  |     |
|                 |     |                 |     |                 |     |                 |     |                  |     |

Table 9. Measurement model

I first conducted regression analysis to examine the direct relationship between social capital and organizational learning since I wanted to compare that relationship with the proposed model which adds mindful use as a missing link. Figure 4 shows these results. The social capital variables explained 21% of the variance in organizational learning. Most direct relationships were significant except climate and shared system vision.





Note: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Figure 4. Regression results for social capital predicting organizational learning.

Next I tested the relationships in the *proposed* model to compare the results. I summarize the results of the structural model in Table 10 and Figure 5. The model explained 31% of the variance in full appropriation, 38% of the variance in heedful use, and 21% of the variance in an individual's contribution to organizational learning. In terms of organizational learning, mindful use and the two control variables, business knowledge and tenure explained just as much variance as the six social capital variables. Reciprocity and task interdependence were not significant in the proposed model but significant in the direct relationship model indicating that it may be important to include both social capital and mindful use as predictors of organizational learning. In both models, identification and innovative climate were significant predictors. As indicated in the table, many of the hypothesized relationships in the proposed model had significant path coefficients.

First, when individuals felt they had strong ties to system experts they were more likely to get more out of the knowledge management system by using more features. Second, having a shared system vision was positively associated with using more features of the system as well as considering the needs of others when using the system. Third, those that identified strongly with the organization were also more likely to use the system in a heedful way. Fourth, when users felt their organization represented qualities pertaining to an innovative personality, they were more likely to use more features. Fifth, a fuller appropriation of the system was significantly positively associated with using a system more heedfully. Finally, although full appropriation was not associated with an individual's contribution to organizational learning, heedful use was. These results show support for the fact that social capital can lead to a more extensive and mindful approach to using knowledge management systems.

The fit of the overall model was also good. Hu and Bentler (1999) recommend joint criteria for assessing good model fit. They suggest a comparative fit index (CFI)  $\geq .96$  AND a standardized root mean square residual (SRMR)  $\leq .10$  OR a root mean-square error of approximation (RMSEA)  $\leq .06$  AND a SRMR  $\leq .10$ . For the current model, the CFI was .95 (only .01 below the criteria), the SRMR was less than .10 and the RMSEA was less than .06. This shows support for the overall fit of the proposed model. Table 11 lists each hypothesis and whether or not it was supported.

| Relationship or Endogenous Variable                    | Path Coefficient |
|--|------------------|
| FULL APPROPRIATION: <b>31%</b> explained variance      |                  |
| HEEDFUL USE: <b>38%</b> explained variance             |                  |
| ORGANIZATIONAL LEARNING: <b>21%</b> explained variance |                  |
| H1: Ties → Full Appropriation                          | .23*             |
| H2: Task Interdependence → Heedful Use                 | .01              |
| H3: Shared System Vision → Full Appropriation          | .20*             |

|   |       |
|---|-------|
| H4: Shared System Vision → Heedful Use                    | .13*  |
| H5: Identification → Heedful Use                          | .20*  |
| H6: Reciprocity → Heedful Use                             | -.07  |
| H7: Innovative and Boy Scout Climate → Full Appropriation | .09*  |
| H8: Innovative and Boy Scout Climate → Heedful Use        | -.00  |
| H9: Full Appropriation → Heedful Use                      | .43*  |
| H10: Full Appropriation → Organizational Learning         | .01   |
| H11: Heedful Use → Organizational Learning                | .14*  |
| <b>Controls:</b>  |       |
| Training → Full Appropriation                             | .21*  |
| Computer Experience → Full Appropriation                  | -.12* |
| KMS Experience → Full Appropriation                       | -.06  |
| Age → Full Appropriation                                  | -.001 |
| Gender → Full Appropriation                               | -.08  |
| Training → Heedful Use                                    | .11*  |
| Tenure → Heedful Use                                      | .02   |
| Business Knowledge → Heedful Use                          | .05   |
| Age → Heedful Use   | -.00  |
| Gender → Heedful Use                                      | -.02  |
| Tenure → Organizational Learning                          | .02   |
| Business Knowledge → Organizational Learning              | .22*  |
| <b>Goodness of fit Statistics:</b>                        |       |
| Comparative Fit Index (CFI)                               | .95   |
| SRMR  | .035  |
| RMSEA   | .09   |

Table 10. Structural Model Results for Study 1

Notes: \* p&lt;.05

N=510

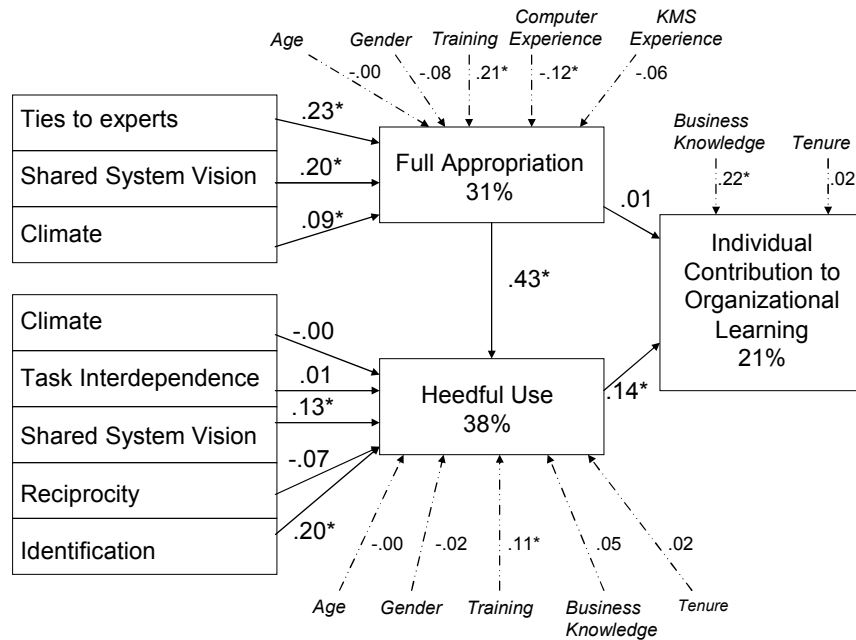


Figure 5. Structural model results for study one

Notes: \*  $p < .05$ 

N=510

|           |   |               |
|-----------|---|---------------|
| <b>H1</b> | Strength of ties with system experts will be positively associated with full appropriation.                       | Supported     |
| <b>H2</b> | Task interdependence will be positively associated with heedful use.  | Not Supported |
| <b>H3</b> | The perception of a shared system vision will be positively associated with full appropriation.                   | Supported     |
| <b>H4</b> | The perception of a shared system vision will be positively associated with heedful use.                          | Supported     |
| <b>H5</b> | Identification will be positively associated with heedful use.  | Supported     |
| <b>H6</b> | Reciprocity will be positively associated with heedful use.   | Not Supported |
| <b>H7</b> | The perception of an Innovative organizational personality will be positively associated with full appropriation. | Supported     |
| <b>H8</b> | The perception of a Boy Scout organizational personality will be positively associated with heedful use.          | Not Supported |
| <b>H9</b> | Full appropriation will be positively associated with heedful use for knowledge                                   | Supported     |

|            |   |               |
|------------|---|---------------|
|            | management systems.   |               |
| <b>H10</b> | Full appropriation will be positively associated with an individual's contribution to organizational learning | Not Supported |
| <b>H11</b> | Heedful use will be positively associated with an individual's contribution to organizational learning        | Supported     |

Table 11. Summary of Hypotheses for Study 1

### 5.1.3 Mediation

Next, I tested the mediation of mindful use. Using Baron and Kenny's (1986) steps for checking mediation, I tested social capital as a predictor of organizational learning and then tested social capital as a predictor of mindful use. Finally, I tested mindful use and social capital as predictors of organizational learning. For full appropriation, there was no mediation affect because full appropriation did not have a significant relationship with organizational learning. For heedful use, there was full mediation between ties to experts and organizational learning. Heedful use did not mediate any of the other relationships between social capital and organizational learning. When heedful use is included as a predictor of organizational learning, the effect that ties to experts has on organizational learning becomes zero. Appendix F outlines the details of this test for mediation. Despite the lack of mediation for many of the social capital variables, there were still significant and interesting results in terms of the relationships between social capital and mindful use and between mindful use and organizational learning.

### 5.1.4 Controls

Training was included as a control variable for this study because training was optional for users unlike the second study where all users had the same mandatory training. As shown in Table 13, training had a significant influence on both full

appropriation and heedful use. The more an individual used the training features, the more likely they were to use the system more mindfully. Individuals who are comfortable using training tools are probably more likely to learn about and explore more features of the technology.

On the other hand, Computer experience had a significant negative relationship with full appropriation. Those with more computer experience used fewer features of the system. It could be that novices are more mindful in their approach to systems. As you have more experience with computers in general, you may be more likely to accept the fact that there will be many features you will not end up using so you may not even bother learning them. Finally, business knowledge had a significant positive impact on organizational learning which is not surprising since part of organizational learning is acquiring and distributing knowledge.

## **5.2 Results - Study 2**

Data for study two came from an international software company that used a knowledge management system to track solutions to user problems on certain complex systems. Certain variables were eliminated from the model based on the results from study one and since the sample size was much smaller. Additionally, I obtained the individual contribution to organizational learning variable from supervisors to ensure no common method variance occurred.

### **5.2.1 Demographics**

The majority of respondents (86%) worked for this company for more than 5 years and almost 60% had worked there for more than 15 years. Approximately one third of respondents had been using the system for more than 4 years, a third had been using it

less than a year, and the other third were somewhere in between. Overall, the respondents spend about 76% of their work time at the office, 31% at home, and 7% traveling. Close to 90% of respondents reported having broadband at work and at home. 62% of respondents are over the age of 35 and 83% are males. 83% work in the U.S. offices and other countries represented were India (11 subjects), UK (1 subject), and Canada (1 subject).

### 5.2.2 Model Assessment

Table 12 lists the descriptive statistics, reliabilities, and correlations for the variables included in the model. The alternate measure for full appropriation was significantly correlated with the initial measure and produced results similar to those mentioned below.

| Construct                   | Mean | s.d. | Alpha | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9   |
|-----------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| 1. Ties                     | 4.49 | 1.51 | .86   | 1     |       |       |       |       |       |       |       |     |
| 2. Interdependence          | 5.40 | 1.24 | .87   | .52** | 1     |       |       |       |       |       |       |     |
| 3. Shared Vision            | 5.04 | 1.19 | .87   | .54** | .62** | 1     |       |       |       |       |       |     |
| 4. Reciprocity              | 5.82 | 1.14 | .81   | .18   | .43** | .26*  | 1     |       |       |       |       |     |
| 5. Identification           | 5.72 | 1.08 | .86   | .44** | .62** | .67** | .44** | 1     |       |       |       |     |
| 6. Boy Scout                | 5.13 | 1.47 | .94   | .44** | .46** | .51** | .36** | .56** | 1     |       |       |     |
| 7. Innovative               | 5.25 | 1.34 | .94   | .43** | .50** | .55** | .29** | .60** | .91** | 1     |       |     |
| 8. Full Appropriation       | 4.57 | 1.20 | .83   | .32** | .34** | .48** | .10   | .34** | .30** | .30** | 1     |     |
| 9. Heedful Use              | 5.17 | 1.09 | .90   | .25*  | .41** | .48** | .22   | .37** | .27*  | .27*  | .45** | 1   |
| 10. Organizational Learning | 5.77 | 0.98 | .78   | .08   | -.03  | .01   | .10   | .23   | .18   | .23   | .05   | .10 |

Table 12. Descriptives, Reliabilities, and Correlations

I used factor analysis to assess the convergent and divergent validity of the constructs within the model. There was evidence of convergent validity because all items had loadings close to or above .60 on their appropriate factor except the third and fourth items for organizational learning. These items had loadings of .30 and .50 respectively.

Table 13 lists all factor loadings.

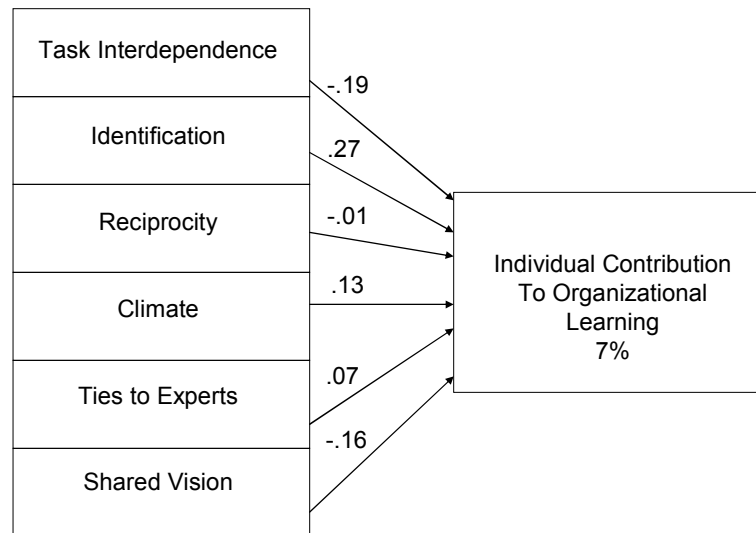
| Organizational Learning |      | Full Appropriation |     | Heedful Use |     | Ties to Experts       |      | Shared System Vision   |      |
|-------------------------|------|--------------------|-----|-------------|-----|-----------------------|------|------------------------|------|
| OL1                     | .88  | FA1                | .55 | HU1         | .70 | TIES1                 | .75  | SVIS1                  | .82  |
| OL2                     | 1.00 | FA2                | .69 | HU2         | .80 | TIES2                 | 1.00 | SVIS2                  | 1.00 |
| OL3                     | .30  | FA3                | .58 | HU3         | .72 |                       |      |                        |      |
| OL4                     | .50  | FA4                | .93 | HU4         | .91 |                       |      |                        |      |
|                         |      | FA5                | .79 | HU5         | .95 |                       |      |                        |      |
| Interdependence         |      | Identification     |     | Reciprocity |     | Boy Scout Personality |      | Innovative Personality |      |
| INTER1                  | .75  | IDENT1             | .70 | REC1        | .67 | BSP1                  | .85  | INN1                   | .87  |
| INTER2                  | .88  | IDENT2             | .94 | REC2        | .64 | BSP2                  | .78  | INN2                   | .89  |
| INTER3                  | .82  | IDENT3             | .82 |             |     | BSP3                  | .99  | INN3                   | .88  |
|                         |      |                    |     |             |     | BSP4                  | .99  | INN4                   | .76  |

Table 13. Measurement model

There was also additional evidence of divergent validity because none of the factors were highly correlated with each other except Boy Scout Organizational Personality and Innovative Organizational Personality. The correlation between these factors was .91. This also occurred for study one so these two variables were again combined to form an overall climate variable. I should also note that this is the third data set which showed evidence of high reliability for the full appropriation scale and the second data set showing high reliability for the heedful use scale.

Although the ultimate goal was to find *links between* social capital and organizational learning, I again tested the *direct* relationships using regression analysis. As can be seen in Figure 6, the direct relationships between social capital and organizational learning were not significant but the social capital variables explained 7% of the variance in organizational learning.





Note: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Figure 6. Regression results for social capital predicting organizational learning.

As mentioned previously, I used regression to analyze the relationships in the proposed model since the sample size was fairly small for this study. 81 users completed the survey for the social capital and mindful use variables but only 51 supervisors filled out the surveys for the final outcome variable, organizational learning. I eliminated some of the variables that were not significant in study one and some of the control variables. I kept business knowledge and tenure in the model as controls for organizational learning since that endogenous variable only had two non-control variable predictors. Figure 7 shows the results of this analysis.

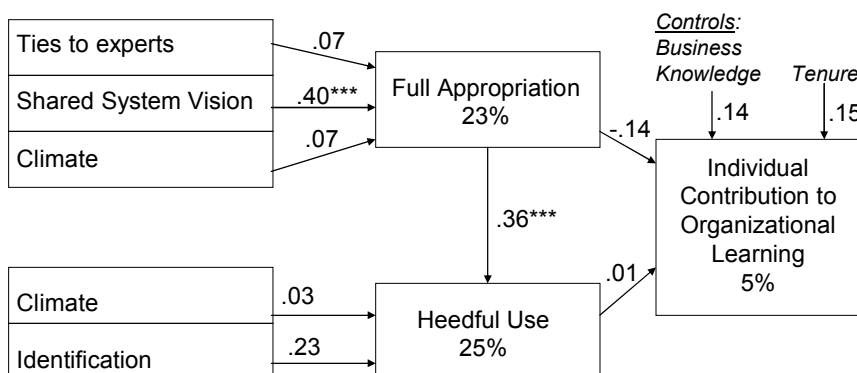


Figure 7. Regression results for study two

As indicated in the figure, there was still very little explained variance in organizational learning even when tenure and business knowledge were included as control variables. It is possible that certain individual characteristics that were not included in the model are more likely to influence organizational learning than how an employee uses a system. For example, conscientiousness may have a major impact on organizational learning activities such as learning about the company's recent developments, retrieving archived information to make decisions, and being aware of who has certain information. Also, as indicated in Figures 6 and 7, there was more explained variance when I analyzed the direct relationship between social capital and organizational learning. However, managers may be less likely to control and influence social capital than use of knowledge management systems. Managers can provide forums for social capital to emerge but may have more control over the implementation

and use of knowledge management systems. The impact of mindful use on organizational learning is also important because knowledge management systems may be more permanent and re-usable than social capital. In terms of turnover mentioned previously, social capital diminishes when employees leave which can negatively impact the tacit knowledge within the organization. The same would not occur with a knowledge management system. The system is fairly permanent and employees can use and re-use the knowledge even when the contributor of that knowledge has left the company. Table 14 lists each hypothesis and whether or not it was supported.

|            |   |               |
|------------|---|---------------|
| <b>H1</b>  | Strength of ties with system experts will be positively associated with full appropriation.                       | Not supported |
| <b>H2</b>  | Task interdependence will be positively associated with heedful use.  | Not Supported |
| <b>H3</b>  | The perception of a shared system vision will be positively associated with full appropriation.                   | Supported     |
| <b>H4</b>  | The perception of a shared system vision will be positively associated with heedful use.                          | Not supported |
| <b>H5</b>  | Identification will be positively associated with heedful use.  | Not Supported |
| <b>H6</b>  | Reciprocity will be positively associated with heedful use.   | Not supported |
| <b>H7</b>  | The perception of an Innovative organizational personality will be positively associated with full appropriation. | Not supported |
| <b>H8</b>  | The perception of a Boy Scout organizational personality will be positively associated with heedful use.          | Not supported |
| <b>H9</b>  | Full appropriation will be positively associated with heedful use for knowledge management systems.               | Supported     |
| <b>H10</b> | Full appropriation will be positively associated with an individual's contribution to organizational learning     | Not supported |
| <b>H11</b> | Heedful use will be positively associated with an individual's contribution to organizational learning            | Not Supported |

Table 14. Summary of Hypotheses for Study 2

I used Baron and Kenny's (1986) test for mediation again to test mindful use as a mediator between social capital and organizational learning. Since there were not significant relationships between social capital and organizational learning, the first step in their criteria was violated and mindful use did not act as a mediator for this data set.

The small sample size could have been the reason for non-significant relationships. This second study is still helpful in that it provides support for the validity of the newly developed constructs and shows that having a shared system vision can impact a fuller appropriation of technology. Additionally, this study provides further support for the idea that full appropriation can impact heedful use. As shown previously, we know that these are distinct constructs so the relationship between them is not due to the fact that these constructs are measuring the same thing.

## **5.3 Discussion**

### **5.3.1 Summary of Results**

First, this research developed two new constructs related to the use of systems in the post-adoption phase. I used mindfulness to develop these constructs and then tested and validated construct scales. Evidence for construct validity was strong given the extensive analysis using card sorting, cluster analysis, expert analysis, factor analysis, and reliabilities. Three data sets provided evidence for the reliability and validity of the full appropriation scale and two data sets provided evidence for the reliability and validity of the heedful use scale. This is a promising first step in capturing mindful use in future research.

Second, this research found support for many of the proposed hypotheses indicating that social capital does influence mindful use of systems and that one form of

mindful use, heedful use, can have a major impact on an organization's ability to learn. Although study one did not show many significant relationships, the overall fit of the model was good which indicates that mindful use of knowledge management systems can be a significant link between social capital and organizational learning.

Study two found that having social ties to system experts, having a shared system vision, and having perceptions that the organization is innovative, lead individuals to get more out of systems by using more of the important features in those systems. It also revealed that using more features of systems, having a shared system vision, and having a strong identification with the organization was significantly positively associated with using the knowledge management system in a more heedful way. I should note that the sample size was much greater for study two so it may be a better representation of the relationships in the model.

The results of these studies show that structural, cognitive, and relational aspects of social capital can influence the way users approach systems in the post-adoption phase. Additionally, study two revealed that heedful use can lead to a greater contribution toward organizational learning. When individuals consider the needs of others when using and populating knowledge management systems, the organization is more prepared to learn. The implications of these findings are discussed next. Then the chapter is concluded with limitations and opportunities for future research.

### **5.3.2 Contributions & Implications**

This research makes a significant contribution to managers and researchers alike given that it a.) Developed two new constructs of system use b.) Examined system use in the post-adoption phase c.) Used mindfulness to explain system use d.) Provided

evidence that mindful use can mediate the relationship between social capital and organizational learning and e.) Found that heedful use can influence organizational learning which may be the missing link between IT and firm performance. With this research, managers can have a better understanding of how they can get users to capitalize on large investments in technology so that they can maximize their return on investment. For the collaborative and integrated systems of today, this is a crucial finding that can alleviate some of the problems of under-utilized systems and can ensure that managers are seeing an impact on firm performance.

This research provides many implications for researchers and practitioners. For researchers, it provides a new way to examine use of systems in the post-adoption phase. It addresses current gaps in the literature on how users are approaching systems once those systems have already been implemented and accepted. There has already been extensive research on user resistance to new technologies and what factors influence an individual's initial acceptance and use of technology. The current research takes the next step by addressing a user's mindful approach to systems in the post-adoption phase. Researchers can use the new scales for full appropriation and heedful use in future models and can replace *general use* with *mindful use* in existing and previously tested models such as the technology acceptance model. For example, Appendix E showed that perceptions from the unified theory of acceptance and use can be important predictors of *mindful* use not just general use.

This research also found divergent and convergent validity for the two newly developed scales for full appropriation and heedful use. These scales can be used by researchers in further studies and can also be treated as distinct constructs even though

mindfulness was the basis for each concept. Full appropriation did not have an influence on organizational learning but heedful use did. This lends support for further studies examining models of organizational learning as a mediator between heedful use and firm performance.

Additionally, since there was a good fit to the model in both studies and since heedful use predicted organizational learning in study two, the current research provides some insight into missing gaps between social capital and organizational learning and between IT and firm performance. Although the model did not measure firm performance, researchers have suggested that organizational learning may be the missing link between IT and firm performance and by showing that heedful use can influence organizational learning, this research shows that the way the system is used in the post-adoption phase can have an impact on how the organization learns which can improve firm performance.

With this research, managers are given tools to facilitate broader use of systems in the post-adoption phase. If managers can ensure individuals have a shared understanding about the goals of a system, those individuals will get more out of the system by using more features. Using more features will then allow those individuals to use the system in a way that considers the big picture and how others within the organization can use the information the system can provide.

Research has already suggested that training plays a major role in getting users to accept and adopt a new technology. The following research goes beyond that since training has often already occurred in the post-adoption phase. Making sure that users have a shared vision about the system is something that managers can work on once the

training has already occurred. This gives them a tool to use once the trainers have done their part. This goes hand in hand with research that suggests top management support is important in getting users to accept and use a system.

Another strategy managers can use once initial training has already occurred is to make sure users have access to experts on the system. Managers can reward individuals that share their knowledge about the system on an ongoing basis and can encourage informal meetings with experts and novices. Having informal relationships with system experts can provide a non-intimidating, non-threatening forum for novices to ask questions they may have been too apprehensive to ask. Additionally, as shown in study two, having consistent access to training tools such as online help files can also instigate a more mindful approach to systems. When systems already have training tools built in, managers can spend less time and money on ongoing training sessions throughout the post-adoption phase of implementation.

Managers can also work on making sure their employees identify with the organization. Morale programs and social activities could be developed in order to instill organizational identification. While many firms find it difficult to develop social capital, some have had great success at it (Cohen and Prusak 2001). In order to bring employees together and establish a sense of community, the SAS Corporation installed a sports center, a medical center with two full time doctors, a childcare facility, and a food plan that encourages employees to eat together. UPS builds social capital by encouraging socializing and promoting from within. The Steelcase Co. uses white boards outside every office to solicit feedback from other employees and prominently displays employee families, hobbies, and interests (Timberlake 2005). These are just some tools that can be



used to instill organizational identification and facilitate social capital development overall.

Managers can also take steps to ensure their employees view the organization as innovative. By allowing employees to voice their opinions and by creating an environment for brainstorming and idea generation, managers can give the employees the perception that the company is innovative which can lead to a fuller appropriation of the systems that the organization has invested in. A climate that supports innovation can allow users to feel comfortable exploring features of new systems.

#### **5.4 Limitations and Future Research**

Some might argue that if full appropriation is based on mindfulness, it should capture the creativity of use or the extent to which the system is used in different ways. Although this may be helpful for personal systems, it is not helpful for managers since they do not necessarily want employees to find new uses for systems that are designed for more efficiency – this could draw attention away from tasks that the system was designed to facilitate. In the same vein, I did not address the fact that in some cases, *mindless* use may be better than *mindful* use if *mindful* use takes away from the efficiency of the task and if tasks are less complex. My research was focused on more complex systems such as knowledge management systems.

It may also be argued that capturing use of features that are *unique* to a certain system would be more helpful since this more accurately captures deviations from premature cognitive commitments. Again, this information may be more useful for personal systems since managers are more concerned about *important* features being used, not necessarily *unique* features being used. Continued research on full

appropriation of personal devices such as cell phones or PDAs using these alternative measures would be interesting and beneficial. A recent Associated Press-AOL-Pew survey of 1,286 cell phone users found that only 6% use the music or video features of phones, 14% use the internet feature, 22% play games with their phones, 28% take pictures with their phones, and 33% use the text messaging feature.

The lack of generalizability of heedful use is another limitation. Since heedful use only applies to systems that require collaboration, the current research may not apply to other types of systems. Future research could address what “mindful use” means for each particular system and could address full appropriation of various types of systems like the pre-test described in Appendix D.

Although mindfulness was used to describe *system use* in the current research, extensions to this study may include a mindful approach to training. For example, trainers could suggest that there may be other uses for certain features or they could train the users on features that initially may not seem useful. If a user is mindful, they may find important uses for these additional features. *Ongoing* training on less used features could also be helpful since knowledge is often lost if not used. In addition to mindful training, research could also examine other types of mindful variables such as mindful leadership or a climate for mindfulness.

Further research should also use the newly developed scales to measure full appropriation and heedful use in alternative models. The current study did not specifically measure firm performance but it would be useful to examine a model that includes heedful use, organizational learning, and firm performance since the current

research provides evidence of a link between heedful use and organizational learning and since others have found a link between organizational learning and firm performance.

Finally, a major limitation for study one was the small sample size. However, that study provided initial evidence toward the validity and reliability of the two new construct scales and also provided support for the overall fit of the proposed model. Further research could test the model in other types of organizations or in other non-business oriented settings such as in the classroom (see Appendix D) or society in general.

## **5.5 Conclusion**

These results are promising because researchers have found empirical evidence that suggests organizational learning is the missing link between IT and firm performance (Tippins and Sohi 2003). Since organizational learning can link IT to firm performance, it is important for researchers to examine how leveraging IT can facilitate organizational learning. The current study found empirical evidence that using a system more heedfully can have a significant impact on an organization's ability to learn. It also provides tools for managers to have an impact on more extensive use of systems so that they can maximize the benefits that systems can provide – managers can improve social capital factors which can influence a more mindful approach to systems.

This research fills many gaps in existing IS literature. First, it develops two new views of post-adoption use based on mindfulness. Previous studies have focused on initial adoption of systems and have not examined system use in terms of mindfulness. Taking this approach allows us to examine use at the feature level which few researchers have done. Second, it examines the influence of social capital on broader views of post-

adoption use. Certain social capital factors can influence broader use of system features and use that considers the needs of others within the organization. Third, it examines how broader types of system use can influence greater organizational learning. If users heed others when contributing to a knowledge management system, the organization is more likely to reap the benefits of organizational learning. Finally, it addresses the need for research that identifies mechanisms through which social capital has its influence on organizational learning and research that examines the link between IT and firm performance. This research gives managers tools to maximize the utility of expensive systems and gives them an understanding of how to leverage these systems for a greater impact on firm performance.

### Appendix A: Review of Mindfulness Studies

| Author/Date  | Method/subjects   | IV   | DV   | Results   |
|--|---|--|--|---|
| Carson, Shih, and Langer 2001                        | In experiment, students asked to recall landmarks on a map            | View map with single perspective vs. multiple perspectives; traditional vs. non-traditional schools                        | Number of landmarks remembered               | For traditional school, more landmarks were remembered for those that viewed with multiple perspectives (mindfulness)   |
| Levy, Jennings, Langer 2001                          | In experiment, senior citizens asked to look at and remember pictures | Four attention interventions where two mindfulness interventions included telling them to notice either 3 – 5 distinctions | Memory of pictures and liking of the stimuli | Varying attention (mindfulness) can improve attention and recall in older individuals   |
| Langer, Janis, and Wolfer 1975                       |   | Perceived control  | Stress reduction and health                  | Positive effects  |
| Alexander, Langer, Newman, Chandler, and Davies 1989 | Elderly   | Mindfulness  | Health and longevity                         | Decreased adverse health symptoms such as arthritis pain and alcoholism and increased longevity   |
| Langer, Beck, Janoff-Bulman, and Timko 1984          | Elderly   | Cognitive deprivation (mindlessness)   | Longevity                                    | Senile individuals identified more novel uses of familiar objects than a control group. These novel uses were labeled as more creative than the uses proposed by the control group. Senile considered more mindful and lived longer than control group. |
| Langer, Hefferman, and Kiester 1988                  | Business employees  | Mindfulness  | Creativity and burnout                       | Mindfulness associated with increased creativity and less burnout   |
| Park 1990  | Businessmen in Korea  | Mindfulness  | Productivity                                 | Mindfulness associated with increased productivity  |

|   |                                       |   |   |  |
|---|---------------------------------------|---|---|--|
| Langer and Piper 1987   | 3 Experiments                         | Introducing objects in a conditional or mindless way (this object "is...") vs. non-conditional or mindful way (this object "could be...") | Creative use of objects                                       | More mindful learning led to using objects more creatively when a novel use for them arose. Conditional understanding of the world appears to prevent mindlessness |
| Langer, Hatem, Joss, and Howell 1989                                    | Experiment                            | Similar to Langer and Piper 1987 only text instead of objects   | Similar to Langer and Piper 1987 only text instead of objects | Mindful introduction to text associated with more creative use of text   |
| Langer 1997   | Experiment with students and teachers | Asked what was meant by paying attention and both groups felt this meant holding the image still  |   | It is hard to stay attentive when holding an image still which is what many believe to be "paying attention"   |
| Langer and Bodner 1997; Langer, Carson, and Shih; Levy and Langer, 1992 | Children, college students, elderly   | People instructed to vary the stimulus, e.g., notice new things about a task (mindful)  | Attention   | Attention, liking, and memory improved when they were instructed to notice new things about the task (mindfulness)   |
| Langer 1997 (Described study with Matt Lieberman)                       | Experiment with students              | Some groups asked to memorize material (mindlessness) while others asked to make it more meaningful for themselves (mindfulness)          | Retention and creativity                                      | Mindful group retained information better and came up with more creative ways of using the information   |
| Langer 1997 (Described study with Matt Lieberman)                       | Experiment with high school students  | Information presented in mindful perspective-taking condition vs. perspective-free (mindless)   | Learning  | Information taught in mindful way was learned better   |
| Langer 1994   | Theoretical review                    | Mindfulness   | Decision-making, evaluation, meditation, eastern religious    | N/A  |

|  |   |  | practices,<br>emotion                 |  |
|--|---|--|---------------------------------------|--|
| Ritchhart and Perkins 2000                 | Field study   | Mindful learning   |                                       |  |
| Kawakami, White, and Langer 2000           | Experiments with undergraduate males and females and male rotary club members | Mindfulness (made the script their own) vs. Mindlessness (act consistently with script)                      | Male perceptions of female leadership | Those that were mindful were viewed as better leaders when they also displayed masculine traits  |
| Langer 1993                                | Review piece on mindful education   |  |                                       | Presents theory behind benefits of a mindful education. Education is often mindless and sport and music are mindful  |
| Langer 1989                                | Review of Mindfulness research  |  |                                       | Mindfulness is beneficial in many ways   |
| Langer, Perlmutter, Chanowitz, Rubin 1988  | Experiments with elderly  | Premature cognitive commitments (mindlessness)   | Aging and Alcoholism                  | Not making premature cognitive commitments (not being mindless) led to ratings of being more alert and active  |
| Langer 1997 (Described study with Bayliss) | Experiment with high school students  | Asked what is meant by "paying attention" to a picture   |                                       | Virtually all said this meant keeping the stimulus constant versus thinking about it in new ways   |
| Langer 1997 (Described study with Bayliss) | Experiment  | Asked subjects to read either familiar or novel story and to concentrate on either 3 or 6 items in the story | Liking of the story                   | Familiar stories were liked better when asked to concentrate on fewer items. Novel stories were liked better when asked to concentrate on more items. Novelty evokes mindfulness so concentration is unfavorable only when mindlessly attending to |

|  |   |   |  |   |
|--|---|---|--|---|
|  |   |   |  | material.   |
| Langer and Brown 1992                      | Experiment with women and watching football   | Drawing distinctions about disliked activities (e.g., football)                               | Liking of the activity                                   | Greater interest and enjoyment in the game when asked to draw more subtle distinctions.   |
| Langer and Brown 1992                      | Experiment where subjects asked to listen to rap or classical and draw either 1, 5, or 10 distinctions. They were asked to either make the distinctions positive, negative, or this was unspecified | Valence of distinctions drawn for certain activity (e.g., positive, negative, or unspecified) | Liking of that activity                                  | Liking increase with number of positive distinctions but did not increase with number of negative distinctions. But when valence unspecified (neither positive nor negative), there was increased liking for the music. |
| Pietrasz and Langer 1995                   | Experiment where females were taught an athletic game in either a mindful-inducing manner (conditional) or a mindless-inducing manner (non-conditional)   | Mindful vs. mindless learning   | Performance  | Those that learned mindfully outperformed those that learned mindlessly. They conclude that those that performed better also liked it better (based on past research)   |
| Langer, Bashner, & Chanowitz 1985          | Experiment, sixth graders   | Either high or low mindfulness treatment  | Viewed slides of either "normal" or "handicapped" people | Mindful children less likely to discriminate for or against the handicapped target and less likely to avoid the handicapped   |
| Langer, Beck, Janoff-Bulman, & Timko, 1984 | 3 studies: 45 76-80 yr olds; 18 65-96 yr old females; 40 people who had died of heart disease (some with senility and some without)   | Mindfulness, senility   | Longevity  | Positive relationship between mindfulness and longevity; Senility may be characterized by mindful cognitive activity; Those with senility lived longer  |
| Langer & Weinman, 1981                     |   | Time to think   | Performance  | Time to think improved  |



|              |                  |  |
|--------------|------------------|--|
|              |                  | performance when discussing a novel issue but time to think stifled performance when discussing a familiar issue.  |
| Langer, 1978 | Conceptual paper | PROPOSED that mindfulness often occurs when there are not expected successes like when external factors disrupt routines or when consequences of familiar behavior are discrepant with past experience. Studies have now empirically shown this. |

### Appendix B: Scale of General Mindfulness

| Individual Mindfulness (Langer 1989)   |
|--|
| 1. I like to investigate things  |
| 2. I generate few novel ideas  |
| 3. I am always open to new ways of doing things                                      |
| 4. I “get involved” in almost everything I do  |
| 5. I do not actively seek to learn new things  |
| 6. I make many novel contributions   |
| 7. I stay with the old tried and true ways of doing things                           |
| 8. I seldom notice what other people are up to                                       |
| 9. I avoid thought provoking conversations   |
| 10. I am very creative   |
| 11. I can behave in many different ways for a given situation                        |
| 12. I attend to the “big picture”  |
| 13. I am very curious  |
| 14. I try to think of new ways of doing things                                       |
| 15. I am rarely aware of changes   |
| 16. I have an open-mind about everything, even things that challenge my core beliefs |
| 17. I like to be challenged intellectually   |
| 18. I find it easy to create new and effective ideas                                 |
| 19. I am rarely alert to new developments  |
| 20. I like to figure out how things work   |
| 21. I am not an original thinker   |

## **Appendix C: Measures for Model Constructs**

### **Network ties (Constant, Sproull, and Keisler 1996)**

1. To what extent do you feel you have a personal relationship with individuals that are considered experts on this system?
2. How easy is it for you to access these system experts?

### **Task interdependence (Pearce and Gregerson 1991)**

1. I work closely with others in doing my work
2. I frequently must coordinate my efforts with others
3. My own performance is dependent on receiving accurate information from others

### **Shared System Vision (adapted from Lee et al. 2005; Tippins and Sohi 2003; Tsai and Ghoshal 1998; and Young-Ybarra and Wiersema 1999)**

1. Employees in this organization have the same ideas about what the system is supposed to accomplish
2. My overall objectives for the system are the same as others within my organization

### **Identification (Mael And Ashforth, 1992; Tyler And Degoey, 1995; Shamir, Zakay, Breinin, and Popper, 1998)**

1. When someone criticizes this organization, it feels like a personal insult
2. When I talk about this organization, I usually say 'we' rather than 'they'
3. This organization's successes are my successes

### **Reciprocity (Constant et al. 1996)**

1. I know that other employees of this organization will help me, so it's only fair to help other employees
2. I trust that someone would help me if I were in a similar situation

### **Organizational personality (Slaughter, Zickar, Highhouse, and Mohr 2004)**

To what extent do you feel your organization encompasses the following traits?

| <b>(Boy Scout)</b>  | <i>Strongly Disagree</i> |   |   |   |   | <i>Strongly Agree</i> |
|---------------------|--------------------------|---|---|---|---|-----------------------|
| Attentive to people | 1                        | 2 | 3 | 4 | 5 |                       |
| Family-oriented     | 1                        | 2 | 3 | 4 | 5 |                       |
| Cooperative         | 1                        | 2 | 3 | 4 | 5 |                       |
| Helpful             | 1                        | 2 | 3 | 4 | 5 |                       |
| <b>(Innovative)</b> |                          |   |   |   |   |                       |
| Creative            | 1                        | 2 | 3 | 4 | 5 |                       |

|             |   |   |   |   |   |
|-------------|---|---|---|---|---|
| Interesting | 1 | 2 | 3 | 4 | 5 |
| Unique      | 1 | 2 | 3 | 4 | 5 |
| Original    | 1 | 2 | 3 | 4 | 5 |

### **Full appropriation (newly developed scale)**

1. I use the system to its full potential
2. I use all the features of the system that I possibly can
3. I could use more features of the system
4. I like to investigate things within the system
5. I seek to learn new things about the system
6. I try to think of new ways of doing things with the system

### 2<sup>nd</sup> measure (study 1 and 2):

Supervisors were asked to list the important features of the system. Users were then asked to indicate to what extent they use those features.

To what extent do you use the following features of the system (employees)?

|                  |                   |   |   |                     |   |
|------------------|-------------------|---|---|---------------------|---|
|                  | <i>Not at all</i> |   |   | <i>All the time</i> |   |
| <i>Feature X</i> | 1                 | 2 | 3 | 4                   | 5 |

### **Heedful use (newly developed scale)**

1. My use of the system is focused on my job, not the jobs of others
2. I consider how others are influenced by my use of the system
3. When I use the system, I consider how others may need the information
4. I tailor the information I enter into the system to others in the organization
5. When I use the system, I am aware of more than just my own perspective
6. When I use the system, I consider how other business functions depend on my business function.

### 2<sup>nd</sup> Measure (study 2):

An objective measure within the system that has a usage count for solutions tied to each employee. Once frequency of problem occurrence is controlled for, this measure should indicate how useful that solution was to others.

### **Individual contribution to organizational learning (Templeton, Lewis, and Snyder 2002)**

1. Employee X learns about the company's recent developments through informal means (such as news stories and gossip) – (knowledge acquisition)
2. Employee X retrieves archived information when making decisions – (organizational memory)
3. Employee X is keenly aware of where his/her knowledge can serve the company – (information distribution)

4. Employee X resists changing to new ways of doing things – (information interpretation)
5. Employee X keeps information (such as, numbers, plans, ideas) away from other employees – (information distribution)
6. When employee X needs specific information, he/she knows who will have it – (information distribution)

**Individual cognitions (see Appendix D) (Venkatesh et. al 2003)**

*Performance Expectancy:*

1. I would find the system useful in my job.
2. Using the system enables me to accomplish tasks more quickly.
3. Using the system increases my productivity.

*Effort Expectancy:*

1. It would be easy for me to become skillful at using the system.
2. I would find the system easy to use.
3. Learning to operate the system is easy for me.

*Social Influence:*

1. People who are important to me think that I should use the system.
2. The senior management of this business has been helpful in the use of the system.
3. In general, the organization has supported the use of the system.

*Facilitating Conditions:*

1. I have the resources necessary to use the system.
2. I have the knowledge necessary to use the system.
3. A specific person (or group) is available for assistance with system difficulties.

**Demographic variables (controls)**

What is your age?

What is your gender? M      F

**Line speed (control)**

At work, what kind of connection do you have to the internet?

28.8Kbps modem, 56Kbps modem, ISDN, cable modem, DSL, T1 or better, do not know

**Computer experience and System experience (controls)**

How long have you been using computers?

How long have you been using the system?

**Business knowledge (control) (Rvan 1991)**

1. Knowledge about the goals and objectives of the organization (i.e., the corporate-wide business entity)
2. Knowledge about the primary functions of the organization

3. Knowledge about the few key factors that must go right if the organization is to succeed
4. Knowledge about the environmental constraints that the organization operates within (e.g., government regulation, supplier relationships, competition, etc.)

**Tenure (control)**

How long have you been working for this company (in terms of years or fraction of a year)?

**Training (control for study one)**

How much [knowledge management system] training have you accomplished (to include online training sessions and online help files)?

### **Appendix D: Pre-test**

An initial pre-test was conducted to assess the construct validity of mindful use. Unfortunately, since students were used for the pre-test, the heedful use part of mindful use did not apply. In other words, the students did not use a system such as a knowledge management system that is necessary for capturing heedful use. Although some of the students were required to use Blackboard, an internet-based course management tool, very few students used features of Blackboard that would allow for heedful use such as discussion boards and collaboration forums. Therefore, the pre-test only tested the full appropriation construct and the validity of the heedful use construct was assessed with the final two data sets.

To assess the psychometric properties of the full appropriation construct, other variables were included in the survey. Since it is expected that the same perceptions that predict general use will predict mindful use, those perceptions from the unified theory of acceptance and use of technology were included. Again, those perceptions are performance expectancy (e.g., usefulness), effort expectancy (e.g., ease of use), social influence (i.e., important people think I should use the system), and facilitating conditions (e.g., having access to necessary resources). If these perceptions are consistently associated with use in general, they should also be associated with fuller use or use of more features of a system. Additionally, to assess the generalizability of the construct and the associated model, students were asked all of the questions about four different types of systems: General application software such as Word, Excel, and PowerPoint; Blackboard (the course management tool mentioned above); mobile devices such as cell phones and blackberries; and the Internet. The survey was given to approximately 200

undergraduate students at a large Mid-Atlantic University. Of those surveys, 188 useable responses were captured and analyzed.

The reliability and validity of the full appropriation construct was assessed in many ways. Descriptive statistics were used to assess scale coverage, Cronbach's alpha was used to assess reliability of the scale, factor analysis was accomplished to assess convergent and divergent validity, and multiple regression was used to test the new construct within a theoretically justified model. These steps are described below.

All items on the survey were scored using a 7-point Likert scale with "Strongly Agree" and "Strongly Disagree" as the end-point anchors and "Neutral" as the mid-point. The scores for the three items were averaged for each person so the lowest possible score is 1 and highest possible score is 7. The range of responses from the pre-test sample was 1 to 7 for software, blackboard, and mobile devices, and 1.67 to 7 for the internet. The items were also averaged among all types of systems and the range was 2 to 7. Therefore, scale coverage was obtained. Additionally, most means were close to 4 with standard deviations close to 1 in all cases. Table 15 shows the descriptive statistics for the averaged items.

|                             | N   | Min  | Max  | Mean | S.D. |
|-----------------------------|-----|------|------|------|------|
| Full appropriation software | 188 | 1.00 | 7.00 | 3.77 | 1.17 |
| FA Blackboard               | 182 | 1.00 | 7.00 | 4.14 | 1.29 |
| FA Mobile devices           | 188 | 1.00 | 7.00 | 4.48 | 1.31 |
| FA Internet                 | 188 | 1.67 | 7.00 | 4.47 | 1.10 |
| Avg FA for all four types   | 188 | 2.00 | 7.00 | 4.21 | .83  |

Table 15. Descriptive Statistics for Full Appropriation items.

Note: Not all respondents used a mobile device and therefore, the N for mobile devices is 182 instead of 188.

Cronbach's alpha was used to assess the reliability of the full appropriation scale. Reliability is the internal consistency of scale items (Nunnally 1978). An alpha between



.65 to .70 is considered minimally acceptable, an alpha between .70 and .80 is considered respectable, an alpha between .80 and .90 is considered very good, and an alpha above .90 may mean that the scale needs to be reduced (DeVillis 1991). The alphas for full appropriation were .72 for software, .79 for Blackboard, .73 for mobile devices, and .63 for the internet. After re-accomplishing an expert analysis of the three full appropriation items, it was determined that the wording of item 3 may have been confusing and evidence supports this since the reliabilities with item 3 removed were .85, .88, .89, .90. The original wording was, “I could use more features of the system but I don’t” and was changed to “I could use more features of the system” for the final survey. Overall, the reliability of the full appropriation scale was acceptable.

Expert analysis also revealed that three items may be too few and may not capture the “mindful” aspect of mindful use. Therefore, after reviewing the general mindfulness items again, 3 more items were added to the full appropriation scale and used in the final survey. Those items are:

1. I like to investigate things within the system
2. I seek to learn new things about the system
3. I try to think of new ways of doing things with the system

These items are more likely to capture the “openness” inherent in being mindful. The original items were limited to feature use and not necessarily capturing a mindful aspect to that feature use.

The next step for the pre-test was to run a factor analysis to assess convergent and divergent validity of the full appropriation construct. Convergent validity is evidence of similarity between related constructs and divergent validity is evidence of dissimilarity between unrelated constructs. In other words, the results of factor analysis should reveal

that all the full appropriation items load together and load on a separate factor from the items that measure other constructs. To assess these forms of validity, it is useful to identify an existing measure for a related yet distinct construct. Since full appropriation was based on mindfulness and since mindfulness has an existing scale, I included those items in the survey. These are unique constructs because mindfulness is an individual trait and mindful use or full appropriation is a type of behavior. Mindfulness and full appropriation should load on two separate factors in the factor analysis. Since the full appropriation of Blackboard had the highest reliability, those three items were used for the factor analysis. Factor analysis for the full appropriation items for software, internet, and mobile devices produced similar results. Principal components analysis with varimax rotation was used and Table 16 shows the results of that exploratory factor analysis.

|                     | Component   |             |
|---------------------|-------------|-------------|
|                     | 1           | 2           |
| Mindfulness1        | <b>.744</b> | <.40        |
| Mindfulness2        | <b>.787</b> | <.40        |
| Mindfulness3        | <b>.733</b> | <.40        |
| Mindfulness4        | <b>.821</b> | <.40        |
| Full Appropriation1 | <.40        | <b>.877</b> |
| Full Appropriation2 | <.40        | <b>.902</b> |
| Full Appropriation3 | <.40        | <b>.728</b> |

Table 16. Factor analysis of Mindfulness and Full appropriation items

These results show that mindfulness and full appropriation loaded on two separate factors with loadings above .60 for the mindfulness items on factor 1 and for the full appropriation items on factor 2. Additionally, the Eigen values for the two factors were 2.6 and 2.0 respectively. The variance explained from each factor was 38% and 28% respectively.

Since general mindfulness does not fall into the domain of information systems, a secondary factor analysis was run with a related but different construct that is also within the domain of IT. Personal innovativeness in the domain of IT was used since it captures an individual's propensity to explore and experiment with technologies and full appropriation is related to the behavior of exploring and experimenting with technology. Table 17 shows the results of that principal component analysis with varimax rotation.

|                     | <b>Component</b> |            |
|---------------------|------------------|------------|
|                     | <b>1</b>         | <b>2</b>   |
| PIIT1               | <b>.82</b>       | <.40       |
| PIIT2               | <b>.51</b>       | <.40       |
| PIIT3               | <b>.82</b>       | <.40       |
| PIIT4               | <b>.89</b>       | <.40       |
| Full Appropriation1 | <.40             | <b>.89</b> |
| Full Appropriation2 | <.40             | <b>.91</b> |
| Full Appropriation3 | <.40             | <b>.71</b> |

Table 17. Factor analysis of Personal Innovativeness and Full appropriation items

The Personal Innovativeness in the Domain of IT items loaded highly on the first factor and the Full Appropriation of Blackboard items loaded highly on the second factor. Based on the results from both factor analyses, the measure for full appropriation exhibits high convergent and divergent validity.

The final step was to assess the psychometric properties of full appropriation by including it in a model with perceptions about systems. As mentioned previously, the perceptions from the unified model are expected to predict post-adoption use (i.e., mindful use). This model is shown in Figure 8.

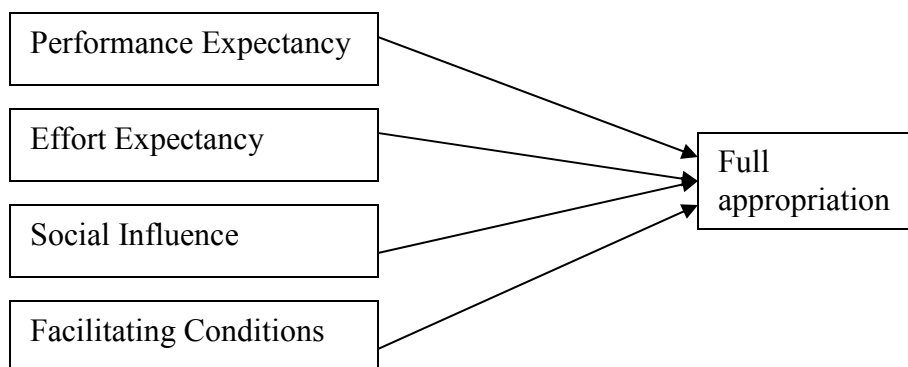


Figure 8. Model used to assess psychometric properties of Full appropriation

As mentioned previously, this model was tested for four types of systems, software (SW), blackboard (BB), mobile devices (MD), and the internet (INT). The correlations for the four models tested can be found in Table 18. The variance explained and beta weights for each of those models are shown in Table 19.

| <b>MODEL1</b>   | <b>R<sup>2</sup> = 15%</b> |             | <b>Intercorrelations</b> |              |              |                   |                   |
|-----------------|----------------------------|-------------|--------------------------|--------------|--------------|-------------------|-------------------|
| <b>Variable</b> | <b>Mean</b>                | <b>SD</b>   | <b>1</b>                 | <b>2</b>     | <b>3</b>     | <b>4</b>          | <b>5</b>          |
| <b>1. PESW</b>  | <b>5.28</b>                | <b>1.12</b> | <b>(.91)</b>             |              |              |                   |                   |
| <b>2. EESW</b>  | <b>5.08</b>                | <b>1.10</b> | <b>.59**</b>             | <b>(.91)</b> |              |                   |                   |
| <b>3. SISW</b>  | <b>4.60</b>                | <b>1.00</b> | <b>.62**</b>             | <b>.51**</b> | <b>(.81)</b> |                   |                   |
| <b>4. FCSW</b>  | <b>5.06</b>                | <b>.81</b>  | <b>.51**</b>             | <b>.53**</b> | <b>.45**</b> | <b>(.56)(.67)</b> |                   |
| <b>5. FASW</b>  | <b>3.77</b>                | <b>1.17</b> | <b>.25**</b>             | <b>.37**</b> | <b>.25**</b> | <b>.13</b>        | <b>(.72)(.85)</b> |

Note. N = 188. Reliabilities (Cronbach's alpha) appear on the diagonal

\*\* . Correlation is significant at the .01 level (2-tailed)

| <b>MODEL2</b>   | <b>R<sup>2</sup> = 35%</b> |             | <b>Intercorrelations</b> |              |              |                   |                   |
|-----------------|----------------------------|-------------|--------------------------|--------------|--------------|-------------------|-------------------|
| <b>Variable</b> | <b>Mean</b>                | <b>SD</b>   | <b>1</b>                 | <b>2</b>     | <b>3</b>     | <b>4</b>          | <b>5</b>          |
| <b>1. PEBB</b>  | <b>4.54</b>                | <b>1.19</b> | <b>(.89)</b>             |              |              |                   |                   |
| <b>2. EEBB</b>  | <b>5.21</b>                | <b>.98</b>  | <b>.47**</b>             | <b>(.89)</b> |              |                   |                   |
| <b>3. SIBB</b>  | <b>4.67</b>                | <b>1.05</b> | <b>.58**</b>             | <b>.49**</b> | <b>(.81)</b> |                   |                   |
| <b>4. FCBB</b>  | <b>5.14</b>                | <b>1.03</b> | <b>.35**</b>             | <b>.63**</b> | <b>.42**</b> | <b>(.68)(.73)</b> |                   |
| <b>5. FABB</b>  | <b>4.14</b>                | <b>1.29</b> | <b>.58**</b>             | <b>.28**</b> | <b>.42**</b> | <b>.22**</b>      | <b>(.79)(.88)</b> |

Note. N = 188. Reliabilities (Cronbach's alpha) appear on the diagonal

\*\* . Correlation is significant at the .01 level (2-tailed)

| <b>MODEL3</b>   | <b>R<sup>2</sup> = 29%</b> |           | <b>Intercorrelations</b> |          |          |          |          |
|-----------------|----------------------------|-----------|--------------------------|----------|----------|----------|----------|
| <b>Variable</b> | <b>Mean</b>                | <b>SD</b> | <b>1</b>                 | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |

|                |             |             |              |              |              |                   |                   |
|----------------|-------------|-------------|--------------|--------------|--------------|-------------------|-------------------|
| <b>1. PEMD</b> | <b>4.78</b> | <b>1.21</b> | <b>(.85)</b> |              |              |                   |                   |
| <b>2. EEMD</b> | <b>5.34</b> | <b>1.14</b> | <b>.61**</b> | <b>(.93)</b> |              |                   |                   |
| <b>3. SIMD</b> | <b>4.24</b> | <b>1.06</b> | <b>.59**</b> | <b>.40**</b> | <b>(.73)</b> |                   |                   |
| <b>4. FCMD</b> | <b>4.74</b> | <b>.82</b>  | <b>.45**</b> | <b>.64**</b> | <b>.41**</b> | <b>(.40)(.63)</b> |                   |
| <b>5. FAMD</b> | <b>4.48</b> | <b>1.31</b> | <b>.41**</b> | <b>.43**</b> | <b>.36**</b> | <b>.49**</b>      | <b>(.73)(.89)</b> |

Note. N = 188. Reliabilities (Cronbach's alpha) appear on the diagonal.

\*\* . Correlation is significant at the .01 level (2-tailed)

| <b>MODEL4</b>   | <b>R<sup>2</sup> = 21%</b> |             | <b>Intercorrelations</b> |              |              |                   |                   |
|-----------------|----------------------------|-------------|--------------------------|--------------|--------------|-------------------|-------------------|
| <b>Variable</b> | <b>Mean</b>                | <b>SD</b>   | <b>1</b>                 | <b>2</b>     | <b>3</b>     | <b>4</b>          | <b>5</b>          |
| <b>1. PEINT</b> | <b>5.73</b>                | <b>.95</b>  | <b>(.89)</b>             |              |              |                   |                   |
| <b>2. EEINT</b> | <b>5.75</b>                | <b>.94</b>  | <b>.80**</b>             | <b>(.93)</b> |              |                   |                   |
| <b>3. SIINT</b> | <b>5.27</b>                | <b>1.06</b> | <b>.68**</b>             | <b>.63**</b> | <b>(.86)</b> |                   |                   |
| <b>4. FCINT</b> | <b>5.38</b>                | <b>.90</b>  | <b>.63**</b>             | <b>.69**</b> | <b>.60**</b> | <b>(.51)(.66)</b> |                   |
| <b>5. FAINT</b> | <b>4.47</b>                | <b>1.10</b> | <b>.38**</b>             | <b>.45**</b> | <b>.31**</b> | <b>.28**</b>      | <b>(.63)(.90)</b> |

Note. N = 188. Reliabilities (Cronbach's alpha) appear on the diagonal.

\*\* . Correlation is significant at the .01 level (2-tailed)

Table 18. Descriptive statistics

|                         | <b>1. Software<br/>(15%)</b> |             |            | <b>2. Blackboard<br/>(35%)</b> |            |            | <b>3. Mobile<br/>Devices (29%)</b> |             |            | <b>4. Internet<br/>(21%)</b> |             |            |
|-------------------------|------------------------------|-------------|------------|--------------------------------|------------|------------|------------------------------------|-------------|------------|------------------------------|-------------|------------|
| Predictor               | Beta                         | t           | sig        | Beta                           | t          | sig        | Beta                               | t           | sig        | Beta                         | t           | sig        |
| Performance Expectancy  | .04                          | .44         | .66        | <b>.52</b>                     | <b>.69</b> | <b>.00</b> | .14                                | 1.56        | .12        | .10                          | .44         | .66        |
| Effort Expectancy       | <b>.36</b>                   | <b>3.96</b> | <b>.00</b> | -.04                           | -4.6       | .65        | .10                                | 1.06        | .29        | <b>.43</b>                   | <b>3.63</b> | <b>.00</b> |
| Social Influence        | .10                          | 1.15        | .25        | .13                            | 1.63       | .11        | .11                                | 1.41        | .16        | .05                          | .48         | .63        |
| Facilitating Conditions | -.13                         | -1.51       | .13        | .01                            | .13        | .90        | <b>.31</b>                         | <b>3.67</b> | <b>.00</b> | -.07                         | -.78        | .44        |

Table 19. Variance explained and beta weights for perceptions

Interestingly, for each model there was only one significant predictor indicating that type of system may moderate the relationship between perceptions and mindful use. However, the data collection site that was used for the final survey only had one applicable system so that moderation effect was not tested in the final analysis.

As shown above, the pre-test results revealed that effort expectancy was the significant predictor for full appropriation of software, performance expectancy was the significant predictor for full appropriation of blackboard, facilitating conditions was the

significant predictor for full appropriation of mobile devices, and effort expectancy was the significant predictor for full appropriation of the internet. When individuals perceive software and the internet as easier to use, they are more likely to use more features. Ease of use does not appear to matter as much for blackboard and mobile devices. For Blackboard, usefulness is more important which makes sense since this is a mandatory, school-related tool designed to simplify course management. Finally, the perception that is associated with more features used in mobile devices is having access to resources such as an instruction manual and technical support which can assist in facilitating use of the system.

Social influence was not a significant predictor in any of the models which is consistent with Venkatesh et al.'s finding that social influence is more important for older workers. Overall, these models support the validity of the full appropriation construct since the perceptions were significant and a significant amount of variance in full appropriation was explained by the perceptions.

### **Appendix E: Partial model tests and comparisons**

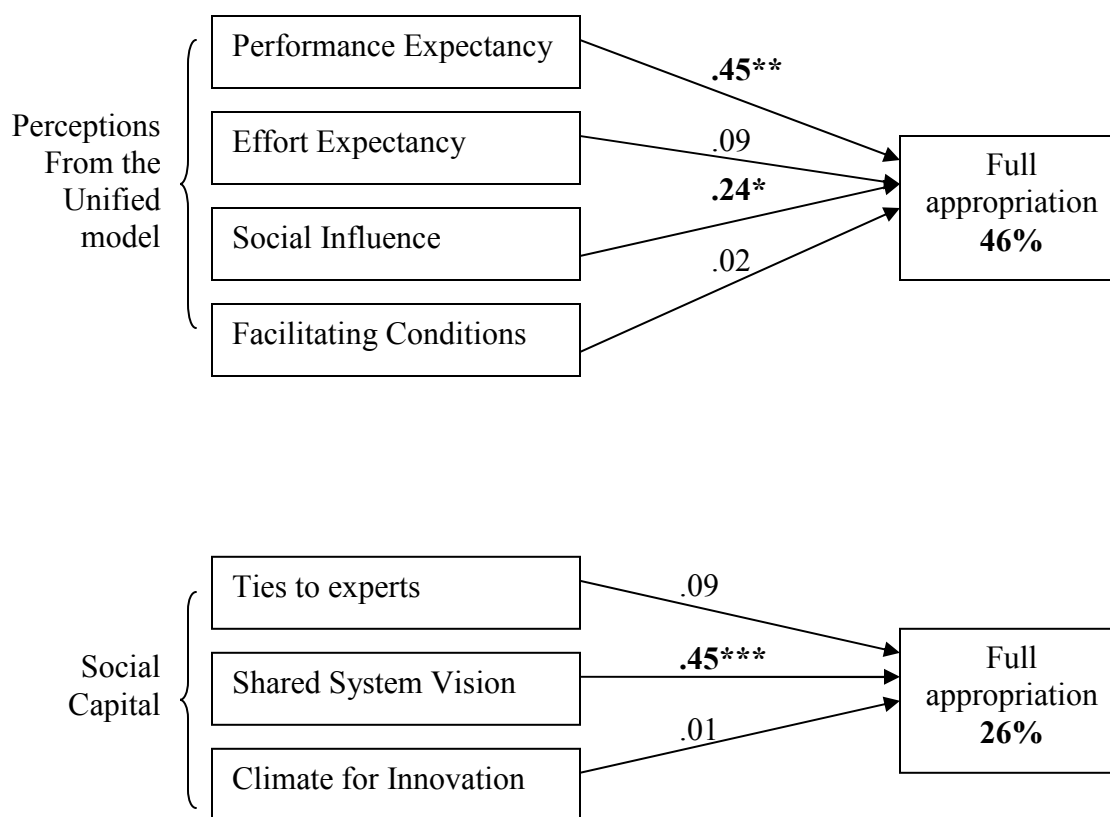
As mentioned previously, since researchers have suggested that individual cognitions from the unified theory should also apply to system use during the post-adoption phase; those cognitions were used for some model comparisons. They were used to compare predictors that have been used with adoption to the current social capital predictors. This was done to determine whether or not cognitions or social capital were better predictors of post-adoption use.

When originally tested, the unified theory outperformed eight other models of use and reported an  $R^2$  of approximately 70% for two separate data sets. If individuals feel that the system is easy to use and useful; feel that important others think they should use the system; and feel they have the resources necessary to use the system, they will intend to use the system and ultimately use it. In the same vein, having these perceptions should be associated with mindful use.

It would have been more helpful to capture these perceptions about each individual feature of the system but since there are 16 items, the survey would have been too long to be accepted by the data site. For example, if there were 20 features, there would have been 320 items to measure those. Even if only one item was chosen from each perception, that would still mean 80 items when there were still many other variables to include. Therefore, to keep the survey at a reasonable length, the 16 *original* items were used. These items include, “I find the system useful in my job”, “I find the system easy to use”, “People who are important to me think I should use the system”, and “I have the resources necessary to use the system.” The original items were stated in a way that implied the system had not been used or accepted yet so the wording was

modified slightly. For example, “I *would* find the system useful in my job” was changed to “I find the system useful in my job.”

Regressions were accomplished to assess the predictive validity of those perceptions and that was compared to the predictive validity of social capital variables as predictors of post-adoption use. In other words, the hypothesized predictors of full appropriation were compared with the unified model perceptions as predictors and the same was accomplished for heedful use. Therefore, a comparison between two models was accomplished for both full appropriation and heedful use. The two models for full appropriation are shown in Figure 9. They include the variance explained (R-squared) and the beta coefficients.



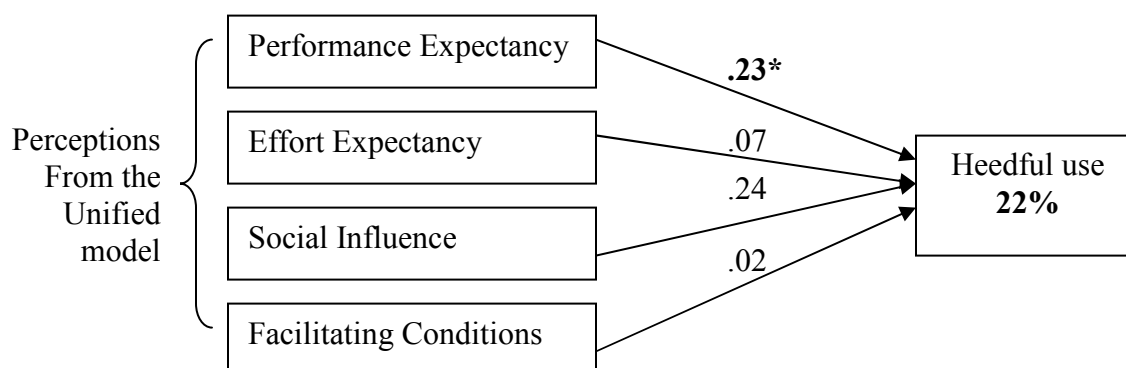
Note: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

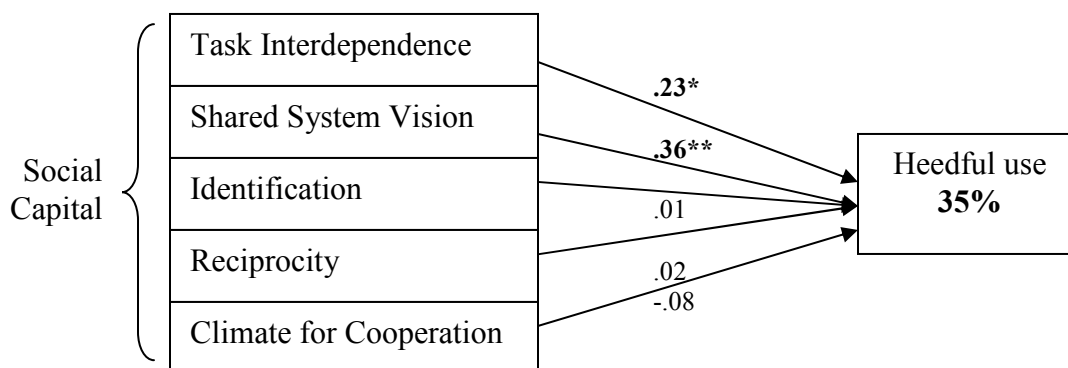


Figure 9. Comparison of full appropriation models

As the models suggest, more variance in full appropriation is explained with the individual perceptions from the unified model. In the first model, performance expectancy and social influence are significant predictors. When employees feel that the system will help them perform better and when they feel that important others think they should use the system, they are more likely to use more features of the system. In terms of social capital, the only significant predictor was a shared system vision. If an individual perceived a shared vision about the goals of the system, they were more likely to use more features of that system.

The models for heedful use, the associated variance explained, and beta weights are shown in Figure 10.





Note: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Figure 10. Comparison of heedful use models

As indicated in the models, more variance in heedful use is explained with social capital variables as opposed to individual perceptions. The significant predictors for heedful use were task interdependence and shared system vision. When individuals must coordinate with others in order to do their jobs, they are more likely to consider the work needs of others when using the system. When individuals perceive a shared vision about the system, they are more likely to consider others when they use the system. It makes sense that social capital variables would be stronger predictors for a construct such as heedful use since it is concerned with paying attention to others.

This part of the research tested the unified model for mindful use in the post-adoption phase and compared that with a model of social capital. It provides further support for the unified model but also shows that social capital variables can also be even more significant when trying to predict use of a system in the post-adoption phase.

### **Appendix F: Test for Mediation Results**

When testing for mediation of a variable B between variables A and C, Baron and Kenny (1986) suggest the following steps:

Step 1: Using regression, show that A correlates with C

Step 2: Using regression, show that A is correlated with B

Step 3: Using regression, show that B is correlated with C even when controlling for A

Step 4: If B completely mediates the relationship between A and C, the affect of A on C controlling for B should be zero.

If the criteria in all 4 steps are met, then B fully mediates A and C. If only steps 1-3 are met, then B partially mediates the relationship between A and C. The four steps as applied to the current research follow:

I first wanted to show that social capital has a significant relationship with organizational learning. As shown previously, the variables that were significant and their beta weights were: Ties to system experts (.13), Interdependence (.17), Identification (.20), and Reciprocity (.20). System vision and climate were not significant predictors of organizational learning.

Next, I wanted to show that the social capital variables were correlated with full appropriation and heedful use (Step 2). For full appropriation, the only significant predictor was ties to experts with a beta weight of .45. For heedful use, the significant predictors were ties to experts and identification with beta weights of .42 and .17 respectively.

For step 3, I included both the mediators (mindful use) and the initial variables (social capital) as predictors of organizational learning. When full appropriation was

included, none of the social capital variables had a zero effect on organizational learning. Therefore, full appropriation was not a mediator. When heedful use was included, ties to system experts had a zero effect on organizational learning. Therefore, heedful use mediated the relationship between ties to experts and organizational learning.

To summarize, full appropriation did not mediate the relationship between social capital and organizational learning but heedful use fully mediated the relationship between ties to experts and organizational learning. Heedful use did not mediate the relationship between the other social capital variables and organizational learning.

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