

The Effect of Socio-Technical System on User Commitment

Research-in-Progress

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Abstract

Many organizations have spent huge investments on information systems (IS) but are unable to achieve the maximum benefits expected. Organizations are able to leverage on their IS investments only at IS infusion which refers to using the system to its full potential. IS infusion is a form of organizational citizenship behavior because full utilization of IS requires extra-role behaviors (i.e., IS use beyond the prescribed usage). IS infusion therefore requires the user's commitment to IS usage. However, there has been lack of understanding about IS infusion, especially from user commitment perspective. This study investigates the formation of user commitment from the socio-technical system design perspective and then the effect of user commitment on IS infusion. We identified five constructs from the socio-technical system design (job fit, task competence, technology competence, self-determination with technology, and self-determination with task). This study contributes to IS infusion research by introducing the formation of user commitment from the socio-technical system design perspective. It also helps managers promote user commitment and eventually IS infusion.

Keywords: IS infusion, user commitment, socio-technical system design

Introduction

Information Systems (ISs) including enterprise systems come at a high price as companies invest gigantic amounts of capital to establish them. Even in cases of successful IS implementations, organizations are still unable to extract full value from their systems (Schrage 2006). The underutilization of implemented IS is a major factor underlying the productivity paradox that resulted in lackluster returns on organizational investments in IS (Sundaram et al. 2007; Venkatesh and Davis 2000). According to the six stage information technology (IT) implementation model (Cooper and Zmud 1990), IS implementation and usage varies over six different stages: initiation, adoption, adaptation, acceptance, routinization, and infusion. Organizations are able to leverage on their IS investments only at IS infusion which refers to *using the system to its full potential* (Saga and Zmud 1994).

Even the importance of IS infusion has been emphasized in the past several decades, it is still inexplicable and understudied. Previous IS research has focused on IS adoption and post-adoption such as IS continuance. Among the limited number of studies on IS infusion, many of them have tried to examine IS infusion based on the viewpoints from technology adoption (Jones et al. 2002; Saeed and Abdinnour 2008), IS continuance (Hsieh and Wang 2007; Wang and Hsieh 2006), and the theory of reasoned action (TRA) (Sundaram et al. 2007). IS infusion is a form of organizational citizenship behavior (OCB) because full utilization of IS requires IS use beyond the prescribed or mandated usage. OCB means an employee's willingness to go above and beyond the prescribed roles which the person has been assigned (Organ et al. 2006). In contrast to IS infusion, technology adoption or IS continuance are not a form of OCB. For this reason, we need a new theoretical viewpoint in examining IS infusion. Previous research (Meyer and Allen 1991; Meyer et al. 2002; Pare and Tremblay 2007) explains that commitment is a key antecedent of OCB.

The purpose of this study is twofold: First, to examine IS infusion from a commitment perspective; and second, to examine the formation of commitment in the use of IS. To achieve this goal, we first propose a new concept of user commitment based on commitment theory (Allen and Meyer 1990; Meyer and Allen 1991; Meyer and Hercovitch 2001). Next, this study proposes various job design factors as the antecedents of user commitment because job design can affect the development of psychological states (Hackman and Oldham 1976) and then empirically tests these hypotheses. In the context of IS use, socio-technical system design can affect the psychological states and work outcomes (Bostrom and Heinen 1977; Hackman and Oldham 1976). For this reason, we will examine job design in terms of socio-technical system design.

This work contributes by extending commitment theory and adds to the literature on IS infusion. It advances the understanding of user commitment, socio-technical system design, and of the IS infusion behavior. Moreover, the study can inform organizations on how to develop user commitment and attain IS infusion. This paper is organized as follows: the next section reviews existing literature on IS infusion and discusses commitment and socio-technical system design. This is followed by our explanation of the research model and hypotheses. We then describe the research methodology. After interpreting the empirical results, we discuss the theoretical and practical implications and conclude with a summary of the study.

Conceptual Background

IS infusion

Cooper and Zmud (1990) introduced the six-stage IT implementation model: initiation, adoption, adaptation, acceptance, routinization, and infusion. The purpose of the six-stage IT implementation model was to facilitate the interpretation of connections between empirical results of different stages. The model begins with initiation, which identifies a match between an innovation and its application in the organization. It is followed by adoption, when a decision is reached to invest resources to accommodate the implementation effort. After that, adaptation occurs when a better fit is achieved by the modification processes that are directed towards individuals/organizations and the technology. Thereafter is the post-adoption stage which includes acceptance, routinization, and infusion. Acceptance refers to the efforts taken to induce organizational members to submit to the use of IT applications (Cooper and Zmud, 1990). Routinization is the routine and regular use of IT applications. When employees are able to utilize the

IS in a way that goes beyond routine and standardized usage, they achieve a higher level of usage that may allow them to exploit the fullest potential of the system (i.e., IS infusion).

To achieve IT-based productivity gains, the technology must be infused (Venkatesh and Davis 2000). IS Infusion, using the IS to its full potential, can occur in three ways: extended use, integrative use, and emergent use (Saga and Zmud 1994). Users thus go beyond the prescribed and mandated use of IS at the stage of IS infusion. Employees can leverage the technology and maximize the ratio of output to input to improve performance, resulting in more positive organizational consequences, at the infusion stage (Cooper and Zmud 1990; Sundaram et al. 2007; Wang and Hsieh 2006).

There have been some researches on IS infusion. Jones et al. (2002) and Sundaram et al. (2007) examined the antecedents of IS infusion in the context of sales force automation system based on the technology acceptance model (TAM) and theory of reasoned action. Similarly, Saedd and Abdinnour-Helem (2008) examined the antecedents of IS infusion based on the TAM. Wang and Hsieh (2006) and Hsieh and Wang (2007) examined IS infusion based on the IS continuance model and TAM. Previous research on IS infusion thus showed the significant role of perceived usefulness and satisfaction in leading to IS infusion.

While it is meaningful to examine IS infusion based on the theoretical lens used in examining technology adoption and IS continuance, there is a limitation in generating new knowledge. Further, IS infusion requires users to go beyond the mandated use of IS to exploit the fullest potential of the system, which is a form of OCB (i.e., an employee's willingness to go above and beyond the prescribed roles which the person has been assigned) (Organ et al. 2006). OCB includes both intra-role and extra-role behaviors (Organ et al. 2006). Motivated employees perform extra-roles voluntarily that beyond their customary job duties. Technology adoption and IS continuance, however, are not necessarily a form of OCB. Previous research (Meyer and Allen 1991; Morrison 1994; Pare and Tremblay 2007) explained commitment is a key antecedent of OCB. We adopt the commitment theory in examining IS infusion as a form of OCB.

User Commitment

Commitment is "a force that binds an individual to a course of action of relevance to one or more targets" (Meyer and Herscovitch 2001) and is experienced by an individual as a mindset (i.e., a frame of psychological state that compels an individual toward a course of action). There are two targets of commitment: commitment to a course of action and commitment to a relationship (Li et al. 2006). Commitment to a course of action is "a state of being in which an individual becomes bound by his actions and through these actions to beliefs that sustain the activities and his own involvement" (Salancik 1977, p. 62). Commitment to a relationship explains an individual's attitude toward a social or business relationship and his motivation to remain in the relationship. Commitment to a relationship has been used in examining relationship marketing (e.g., Bansal et al. 2004) and employee management (e.g., Meyer et al. 1993).

As a psychological state, commitment has three sub-types: affective commitment, normative commitment, and continuance commitment (Meyer and Allen 1991). Affective commitment means an emotional attachment or affective orientation toward the target of commitment. Normative commitment means an obligation to maintain relationship with the target of commitment. Continuance commitment means that maintaining relationship with the target of commitment results from the perception of discontinuance costs. Among the three sub-types of commitment, however, affective commitment is expected to have the strongest positive relation with desirable work behaviors (e.g., OCB) (Meyer et al. 2002). In contrast, continuance commitment (i.e., discontinuance costs) is expected to be unrelated and normative continuance (i.e., obligation) is expected to have a weak effect on OCB. Morrison (1994) further describes that a strong affective commitment motivates individuals to construe their work role as extending beyond tasks formally prescribed, which in turn encourages them to adopt extra role behaviors.

Commitment theory has been adopted in IS research. Previous research has examined the effect of commitment on IS continuance intention (Li et al. 2006; Wang and Datta 2010), user satisfaction (Doll and Torkzadeh 1989), and performance (Chang et al. 2010). Similarly, Malhotra and Galletta (2005) examined the effect of commitment on system adoption and usage behavior as well as perceived beliefs such as usefulness and ease of use. Previous research (Shaw and Edwards 2005) has also explored potential antecedents of user commitment to implementing a knowledge management strategy. Doll and Torkzadeh (1989) proposed trust and sense of control as antecedents of

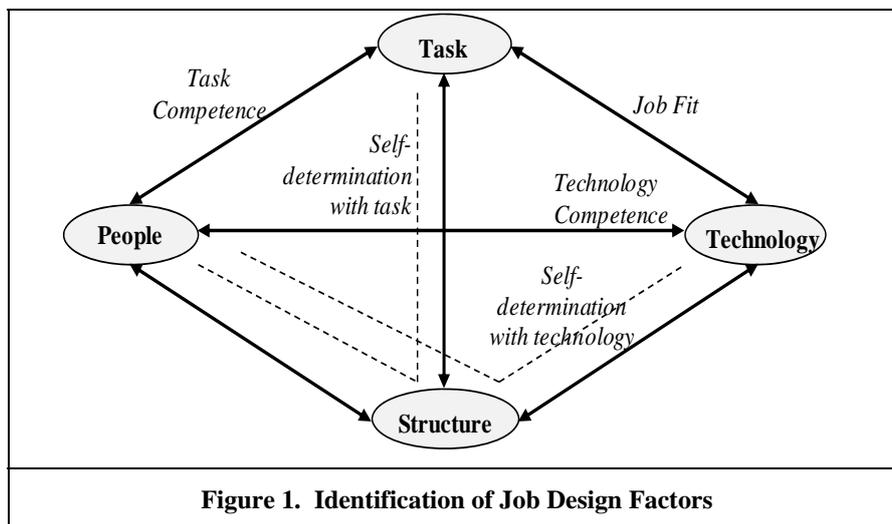
commitment. Chang et al. (2010) proposed ability and extrinsic motivation as antecedents of user commitment. There has been lack of understanding about the development of commitment and the role of commitment in IS infusion.

The main premise of commitment theory is that employees with commitment will exhibit OCB such as extra-role behaviors (Meyer and Allen 1991; Meyer et al. 2002; Pare and Tremblay 2007). In the same vein, user commitment as affective commitment parallels this view of its effect of motivating extra-role behavior and the use of IS to its full potential (i.e., IS infusion). This study defines user commitment in relation to a course of action as *an individual user's psychological attachment to system usage in performing tasks*. User commitment as psychological state thus represents a motivational force. Previous research (Hackman and Oldham 1976) explains that job designs including the characteristics of job can create the psychological states. The socio-technical system (STS) approach to work design, providing significant insight especially in the context of IS use (Bostrom and Heinen 1977), can affect the development of psychological states (Hackman and Oldham 1976).

The Socio-Technical System

STS represents an organization's work system and comprises of two interacting systems – social and technical (Bostrom and Heinen 1977). The social system includes structure and people, whereas the technical system includes technology and task. Leavitt (1989) further explained each of the four elements. Task refers to work or function to be performed. People refer to actors performing task. Technology refers to the body of knowledge and tools that will be applied for task. Structure includes systems of communication, systems of authority or other roles, and systems of workflow. The important implication of STS approach in work design is that the output of this work system results from the joint interaction between the two systems (Bostrom and Heinen 1977). That is, the four elements of STS interact each other over the two systems and the level of fit between elements can affect the development of psychological states and the output of the work system.

As job designs including the characteristics of job can create the psychological states (Hackman and Oldham 1976), we will examine how the interactions between elements of STS can affect the development of user commitment. Figure 1 shows the interactions between elements and the identification of five constructs from the interactions.



Task-Technology Interaction: Job Fit

Task-technology interaction means the match between the task to be performed and the technology for the task. The effect of task-technology interaction is supported by other studies which found that successful innovation and adoption occurs when the task and the technology are compatible (Cooper and Zmud 1990). As a factor

corresponding to task-technology interaction, task-technology fit explains the interaction between task requirements and the functionality of target technology (Goodhue and Thompson 1995). At micro level, the task-technology fit examines how a specific component of a technology helps an individual to perform a specific task or subtask. As this study focuses on how technology can affect an individual's performance of organizational tasks in general, task-technology fit is not appropriate. We propose job fit as a corresponding factor to task-technology interaction from a more general perspective. Job fit means *the degree to which an individual believes that using the technology can enhance the performance of his or her job* (Thompson et al. 1991).

People-Technology Interaction: Technology Competence

People-technology interaction refers to a match between an individual and the technology used by the person. To use technology, an individual should have the relevant skills and knowledge. Previous studies have shown the importance of individual-technology interaction in promoting managerial effectiveness and innovative behavior (Blili et al. 1998; Spreitzer 1995; Munro et al. 1997). We propose technology competence as a corresponding factor to people-technology interaction. Technology competence means *the perceived degree to which an individual has relevant knowledge, skills and confidence in his or her ability to use the system* (Munro et al. 1997).

People- Task Interaction: Task Competence

People-task interaction refers to a match between an individual and the task that is performed by the person. To perform the tasks effectively, individuals should have the relevant knowledge, skills and confidence. Perceived self-confidence, knowledge and skills are all necessary abilities for making effective task-related decisions and execution. We propose task competence as a corresponding factor to people-task interaction. Task competence means *the perceived degree to which an individual has relevant knowledge, skills and confidence in his/her ability to perform tasks* (Ritter and Gemunden 2004).

People- Structure-Task Interaction: Self-determination with Task

As this study centers on individual level interaction instead of organizational level, we will focus on a specific component of structure – the authority system. The authority system reflects how much power and control is delegated to individual employees and behavior varies with increasing authority. The degree of permissible authority of an individual may affect his or her attitude in performing tasks. People-structure-task refers to a match among individual, structure (i.e., authority), and task. We propose self-determination with task as a corresponding factor to people-structure-task interaction. Self-determination with task means *an individual's sense of having choice in regulating and performing tasks* (Deci et al. 1989).

People-Structure-Technology Interaction: Self-determination with Technology

Similar to people-structure-task interaction, people-structure-technology interaction refers to a match among individual, structure (i.e., authority), and technology. The degree of permissible authority of an individual in using technology may affect the individual's attitude in using the technology at work. We propose self-determination with technology as a corresponding factor to people-structure-technology interaction. Self-determination with technology means *an individual's sense of having choice in using and regulating the system* (Deci et al. 1989).

Research Model and Hypotheses

The psychological states of employees that must be present for internally motivated work behavior can be created through the design of job (i.e., job characteristics) (Hackman and Oldham 1976), which forms the theoretical framework used in developing our research model. As for psychological state, we propose user commitment. As for job design, we select the STS design approach and propose five constructs representing different interactions in the STS design. As for internally motivated work behavior, we select IS infusion as organizational citizenship behavior.

Consequence of User Commitment

As we discussed before, this study considers IS infusion as a form OCB. Previous research (Meyer and Allen 1991; Meyer et al. 2002; Pare and Tremblay 2004) has explained that commitment as psychological state has a strong relationship with OCB. Especially, affective commitment has been proposed as a key antecedent of OCB in comparison with normative commitment and continuance commitment (Meyer et al. 2002). A strong affective commitment motivates employees to deduce their work role as extending beyond tasks formally prescribed, which in turn encourages them to adopt extra role behaviors (Morrison 1994). User commitment as affective commitment parallels this view of its effect of motivating extra-role behaviors.

User commitment refers to a motivational force, representing an individual user's psychological attachment to system usage in performing tasks. Users are typically mandated to adopt and use information systems in organizational settings, especially in the use of enterprise systems. Because most enterprise systems (e.g., enterprise resource planning systems and customer relationship management systems) are tightly integrated with tasks over workflows, employees have to use the systems in performing their tasks (e.g., monitoring, analysis, decision making, reporting, and communicating). If employees are not highly motivated, however, they may not try to use the system beyond the prescribed way. In contrast, the strong motivational force (i.e., user commitment) may inspire users to use the system even beyond the prescribed ways. User commitment thus motivates the user to use the system to its full potential by exploring more features of the technology and discovering innovative ways of system usage in performing tasks.

H1: User commitment has a positive impact on IS infusion

Antecedents of User Commitment

Job fit refers to how well the technology of interest supports target tasks and enhance job performance (Speier and Venkatesh 2002; Thompson et al. 1991). Job fit as performance expectancy can directly affect target behavior in the use of IS (Venkatesh et al. 2003). Performance expectancy, the expectation of high work performance and outcomes, can also influence an employee's psychological state at work (Chang et al. 2010). Bandura (1989) also explained that outcome expectation influences an individual's affective reaction to the target technology. As the level of fit between task and technology increases and produce better outcomes, the users may develop stronger psychological attachment to the use of technology in performing tasks (Speier and Venkatesh 2002). Similarly, previous research (Malhotra and Galletta 2005) examined the relationship between performance expectancy (i.e., perceived usefulness) and commitment to system use.

H2: Job fit has a positive impact on user commitment

Technology competence refers to how well an individual has relevant knowledge, skills, and confidence in using technology of interest (Munro et al. 1997). Competence beliefs operate on behavior and actions through motivation and affective process. High technology competence first motivates an individual's interest and involvement in the use of technology (Deci and Ryan 1987). Competence is thus related to intrinsic motivation. Bandura (1989) also explained that self-efficacy influences an individual's affective reactions to the target technology. The stronger people believe in their capabilities, the greater and more persistent are their efforts (i.e., motivation force) (Bandura 1989). As an individual's technology competence increases, the person may develop stronger psychological attachment to the use of technology. Similarly, previous research (Chang et al. 2010; Malhotra and Galletta 2005) examined the relationship between effort expectancy (i.e., ability and perceived ease of use) and user commitment.

H3: Technology competence has a positive impact on user commitment

Similar to technology competence, task competence refers to how well an individual has relevant knowledge, skills, and confidence in performing tasks of interest. High task competence may motivate an individual's interest and involvement in the target tasks (Deci and Ryan 1987). Bandura (1989) also explained that self-efficacy influences an individual's affective reactions to the target tasks. As an individual's task competence increases, the person may develop stronger motivational force regarding the task, i.e., performing task. Performing tasks requires employees to use IS. Task competence, therefore, may lead employees to develop psychological attachment to the use of IS in performing tasks.

H4: Task competence has a positive impact on user commitment

Self-determination reflects autonomy in the initiation and continuance of work behaviors and processes. As a specific type of self-determination, self-determination with technology refers to whether an individual has authority and autonomy in deciding how to use technology of interest. In addition to competence, autonomy in the use of technology can motivate an individual's interest and involvement in the use of technology (Deci and Ryan 1987). Autonomy in the use of technology contributes to a higher level of technological determination. Self-determination with technology may thus develop motivational force regarding the use of technology by resulting in learning, interest in the target activities, and resilience even in the face of adversity. Previous research (Doll and Torkzadeh 1989) also suggested the relationship between sense of control and commitment. Self-determination with technology, therefore, may lead users to develop psychological attachment to the use of IS.

H5: Self-determination with technology has a positive impact on user commitment

As another specific type of self-determination, self-determination with task refers to whether an individual has authority and autonomy in deciding how to perform tasks. Self-determination in performing task can motivate an individual's interest and involvement in performing the target task (Deci and Ryan 1987). Similar to self-determination with technology, autonomy in performing task contributes to a higher level of task determination. Performing tasks, however, requires employees to use IS. Self-determination with task may thus develop motivational force regarding performing tasks with the use of IS. Self-determination with task, therefore, may lead users to develop psychological attachment to the use of IS.

H6: Self-determination with task has a positive impact on user commitment

Concluding Remarks

While organizations are able to leverage on their IS investments only at IS infusion (Saga and Zmud 1994), there has been very few research on it. Even the handful research on IS infusion, many of them (Hsieh and Wang 2007; Jones et al. 2002; Saeed and Abdinnour-Helm 2008; Sundaram et al. 2007; Wang and Hsieh 2006) examined IS infusion based on the theoretical background used for technology adoption and IS continuance. However, IS infusion is a type of OCB requiring extra-role behaviors as well as intra-role behaviors. OCB can be explained in terms of strong psychological attachment to the target. There has been no research on examining IS infusion from such a psychological attachment perspective. Going beyond previous research, this study examines IS infusion as a type of OCB in terms of user commitment by conceptualizing user commitment as an affective commitment to the use of IS in performing tasks based on the theoretical background from OCB (Organ et al. 2006) and commitment (Meyer and Allen 1991). This study further examines the development of user commitment in terms of STS design because job design can create employees' psychological states (Hackman and Oldham 1976).

A number of studies have highlighted underutilization of developed IS and low return of IS investment (Morphy 2006; Ventana Research 2006). Given that organizations continue to make significant investments in IS and spending on IS is expected to reach US\$300 billion by 2013 (Gartner 2009), studies along this direction can be useful in informing organizations on how to improve IS utilization and return on IS investment.

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