A Multilevel Approach to Examining Continuance Usage of Information Systems

ABSTRACT

The user's usage continuance of an information system (IS) has been considered as a key factor in determining whether an IS is useful or not. This usage continuance not only allows firms to recoup their IS investment but also represents the sustainability of IS success. However, continuance of IS usage is a long-term organizational process; it can be influenced by contingency factors (e.g., environmental and situational conditions) and has different effects on IS users. This paper attempts to apply the contingency theory approach to explore the complex relationship between IS effectiveness and user's usage intention. Contingency factors usually are organization-dependent, thus we must examine their differences between organizations. For this purpose, we proposed a multilevel research model using hierarchical linear modeling (HLM) method. A sample of 485 IS users and 166 IS department employees from 47 firms was surveyed to verify our model. The findings have several implications for IS management.

Keywords: information quality, system quality, perceived load, perceived benefit, self-efficacy, service-oriented citizenship behavior, IS usage continuance.

1. Introduction

Continuance usage is critical to firms' realizing the full benefits of an information system (IS) they implemented (Bhattacherjee, 2001; Jasperson, Carter, & Zmud, 2005; Lippert & Forman, 2005). For various reasons, people may be reluctant or even resistant to continue using of an IS in work contexts (Bharati & Chaudhury, 2004; Olfman & Pitsatorn, 2000). This alarming phenomenon in part explains the intriguing disparity between technology investments by firms and actual benefits they realize (e.g., Brynjolfsson & Hitt 1996; Hong, Kim, & Lee, 2008; Santhanam & Hartono 2003). Continuance usage is critical to successful system implementation and is indispensable to technology-enabled productivity and competitiveness improvement (Venkatesh, 2000). Yet, many firms struggle to maintain desired continuance usage that can be affected by individuals' beliefs and attitudes, systems characteristics, or organizational conditions. According to Chau and Hu (2002), system usage is influenced by factors germane to individual users, the focal information system, and the organizational context.

Continuance usage can be reasoned with contingency theories (Limayem & Cheung, 2011), which suggest that the design of an organization and its subsystems must "fit" with the external environment; that is, an effective organization not only has a desirable "fit" with the environment but also maintains such a fit between its subsystems (Drazin & Van de Ven, 1985; Weill & Olson, 1989). Through this lens, continuance usage can be analyzed with key contingency factors that allow firms to adapt to the environment for improved performance (Zorzini, Hendry, Stevenson, & Pozzetti, 2008). Knowing these factors, researchers and managers then can better understand why or why not people continue using an information in the organizational work context.

Previous research has identified several important system characteristics affecting both initial

and continued use of a system by the targeted users (DeLone & McLean, 1992; Taylor & Todd, 1995). In general, people are willing to continue using a system if they benefit from such continuance usage (Bharati & Chaudhury, 2004); they likely will discontinue using the system if that is associated with increased work loads and stress (Olfman & Pitsatorn, 2000). System characteristics also matter. For example, system quality and information quality can influence continuance usage. From a user's perspective, system quality embraces a system's reliability, flexibility, and ease of use (Li, 1997; Seddon, 1997), whereas information quality refers to the degree to which the information produced by the system is adequate, accuracy, complete, and timely (DeLone & McLean, 1992; Seddon, 1997; Rai, Lang, & Welker, 2002). Organizational resources are needed to ensure desired system characteristics and foster continuance usage. Toward that end, service-oriented organization citizen behaviors (SOCB) exhibited by IS staff is essential because an individual's decision to continue using a system is greatly influenced by the IS services he or she receives (DeLone and McLean, 2003).

The effects of system characteristics or organizational context on system usage have been studied at individual or organizational levels exclusively. The effects revealed at one particular level, organizational or individual, cannot provide a complete, integrated view of continuance usage. For example, a firm may overlook the effects of (internal) IS services on employees' use of an information if it focuses on individual perception and system use because the individual-level-only perspective does not consider the contextual factors that may also individauls' behaviors in the organization (Kozlowski & Klein, 2000). Similarly, the effects found by an organization-level analysis fail to consider individuals' considerations and differences.

Despite the importance of individual- and organization-level factors, few studies, if any, have examined continuance usage from a multilevel perspective (Burton-Jones & Gallivan, 2007).

Toward that end, key system characteristics (such as system quality and information quality) and service-oriented behaviors of IS staff are essential organization-level factors, as they are often perceived by individual employees as essential contextual factors effecting their use of an information system. A multilevel approach to examine continuance usage is appealing because it allows us to understand whether individual-level factors remain important when taking into consideration important factors at the organizational level; it also allows us to examine whether the factors of different levels may interact and thus jointly affect continuance usage.

Previous studies have examined initial user acceptance measured by intention or actual usage extensively. Of particular importance is technology acceptance model (Davis, 1989), a parsimonious model capable of explaining considerable variances in intended or actual technology use, particularly right after the system implementation (or initial user training). A review of extant literature suggests much fewer investigations of continuance system usage, toward which the IS success model (DeLone & McLean 1992) offers a logical framework for analysis. In response, this study attempts to address the following questions:

1. What are some of the key factors affecting continuance usage of information systems an organization already implemented?
2. How do key factors germane to individual or organization jointly affect continuance usage?

We propose a factor model for continuance usage and test this model with data collected from a survey study involving voluntary 485 ordinary users and 166 IS professionals in 47 firms. Our model extends the IS success model by specifying plausible relationships between the identified determinants of continuance usage. We analyze the participants' responses from a multi-level perspective that integrates contingency theories.

2. Literature Review and Motivation

In this section, we provides an overview of contingency theories, review prior research examining continuance IS usage, describe IS Success Model, and highlight the gap that motivates our research.

2.1 Overview of Contingency Theories

A contingency approach is proposed to study organization management, contrary to a common emphasis of "one best way" to organize (Burns & Stalker, 1961; Tosi & Slocum, 1984). This approach recognizes the diverse nature of an organization and attempts to interpret and understand how organizations operate in different conditions, internal and external (Weill & Olson, 1989). The resulting contingency theories stress the importance of situational factors in organization management that underline plausible relationship between firm strategy and contextual factors of environmental or organizational consideration (De Nisco & Napolitano, 2006; Keller, 1994; Khazanchi, 2005; Zeithaml, Varadarajan, & Zeithaml, 1988).

In general, contingency theories postulate that firms need to maintain a "fit" between business strategy and organizational factors for improved business performance (Dawes & Massey, 2005; Keller, 1994; Khazanchi, 2005; Weill & Olson, 1989). The differences in organizational factors can partially explain why firm adopting an identical system (such as an ERP system) can differ in performance significantly. From the perspective of contingency theories, such factors constitute contingency factors and can be categorized as system-oriented or organization-specific (Zorzini, Hendry, Stevenson, & Pozzetti, 2008).

Also related is the situational strength theory (Mischel 1977), which provides a lens for characterizing situational differences (such as strong versus weak), hereby allowing us to examine the influences of individual-level factors. Take a "strong" situation for example, expectations about desirable behaviors are relatively uniform and unambiguous, whereas similar normative expectations about behaviors are limited or even absent in a "weak" situation (Liao & Chuang, 2004; Mischel, 1977). Situational constraints may have adverse effects on individuals as they reduce the positive influences of the firm's strategies on motivating employees (Peters & O'Connor, 1980; Phillips & Freeman, 1984). The strength of a situation in which individual behaviors take place may "moderate" the relationship between individuals' beliefs and actual behaviors (Liao & Chuang, 2004; Mullins & Cummings, 1999).

2.2 Continuance IS Usage

Continuance usage is a common barrier to system implementation success (Lyytinen & Hirschheim, 1988; Bhattacherjee, 2001). Such usage, voluntary in nature, is particularly important in work contexts as firms continue deploying information systems at an increasing pace. Prior research seems to focus on user acceptance shortly after system implementation and measures it with intention to use of initial system usage. Fewer studies examine continuance usage, which arguably is more critical to system implementation success than initial user acceptance. As Bhattacherjee (2001) noted, "initial acceptance of IS is an important first step toward realizing IS success, long-term viability of an IS and its eventual success depend on its continued use rather than first-time use" (pp. 351-352).

There has been growing research efforts focused on post-adoption behaviors such as continuance (e.g., Bhattacherjee & Premkumar, 2004; Saeed a& Abdinnour-Helm, 2008; Venkatesh & Goyal, 2010) in recent development IS literature. One major stream of the research efforts derived from the IS continuance model proposed by Bhattacherjee in 2001.

As one of the earliest efforts to differentiate continuance from acceptance and to theorize IS continuance, Bhattacherjee (2001) integrated expectation confirmation theory (ECT) and findings from studies of IS usage to develop this model that postulates satisfaction of prior usage of a given system and perceived usefulness of further usage determine the users' intention to continue using that information system. According to this model, both satisfaction and perceived usefulness are based on the extent to which the users' initial expectations of IT usage were confirmed during the prior usage experience, whereas perceived usefulness is proposed to influence satisfaction perception. A substantial body of empirical data in support of this model has accumulated. Some studies extend the model by including additional model variables, such as Internet self-efficacy (Hsu, Chiu, & Ju, 2004; Bhattacherjee, Perols, & Sanford, 2008), perceived playfulness (Lin, Wu, & Tsai, 2005), perceived ease of use (Thong, Hong, & Tam, 2006) and facilitating conditions (Bhattacherjee, Perols, & Sanford, 2008). Others have examined different kinds of expectations concerning the system and user attributes (Staples, Wong, & Seddon, 2002). Those studies, like many others investigating IS usage, have treated all influencing factors as individual-level variables without taking into account the potential impact of organization-level factors in the context.

2.3 Information System Success Model

Based on a review of the research published during 1981 and 1987, DeLone and McLean (1992) proposed a model of IS success that identified six components of IS success: Information quality, system quality, use, user satisfaction, individual impact, and organizational impact. Since then, a number of studies have attempted to further the understanding of the DeLone & McLean (D & M) model by investigating some, or all, of the model factors. In an effort to compare the D & M model with the model re-specified by Seddon (1997), Rei et al., (2002) found the D & M model stood up reasonably well and outperform the Seddon model. Similar findings also derive from the study of Sedera et al.

(2004) in which several success models of IS were tested against empirical data. While some researchers have attempted to examine one or more relationships in the D & M model with meta-analyses (e.g., Mahmood, Hall, & Swanberg, 2001; Bokhari, 2005; Sabherwal, Jeyaraj, & Chowa, 2006), Sabherwal et al's (2006) work represents the most comprehensive study to synthesize the research related to IS success and has validated a substantial portion of the D & M model.

While a number of studies have provided support for the proposed interrelationships among components in the D & M model, many questions remain unanswered. In specific, previous studies have adopted different measures of IS use, including intention to use, frequency of use, self-reported use, and actual use. The different measures could be the cause that have led to mixed results found between "use" and other ISS components in the model. For example, duration and frequency of IS use does not necessary indicate success of the IS (Doll & Torkzadeh, 1998) because the more use could result from ineffectively designed system. Further, compared to system quality, information quality and service quality have received relatively less research attention regarding their effects on IS use. Failure to consider each of them could prevent a further development of knowledge for IS success. In addition, few studies have considered the relationships that comprise the IS success from an organizational point of view. Thus, Burton-Jones and Gallivan (2007) suggested the need to examine IS use from a multilevel perspective across the individual and organizational levels to improve current understanding of this phenomenon.

3. Research Model and Hypotheses

We propose a factor model for continuance usage, which include key factors specific users, the system, and the organizational context. Specifically, perceived benefits and perceived load are two essential individual-level factors. The model also includes two important

system-oriented factors: system quality and information quality. In addition, our model includes service-oriented organization citizen, an organization-specific factor that can affect continuance usage significantly. Figure 1 depicts our proposed model.

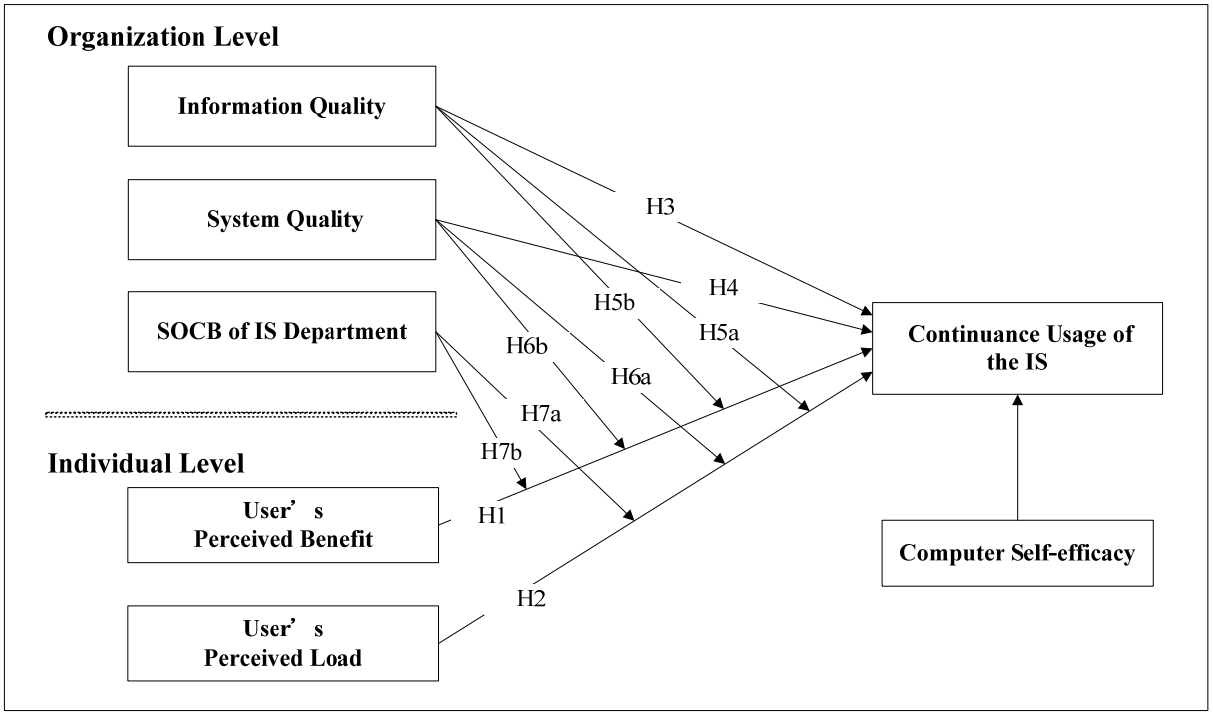

Figure 1. Research Model

3.1 Individual-Level Predictors of IS Usage

In an attempt to interpret and clarify D & M's model, Seddon (1997) considered IS usage to be a behavior resulting from successful information system. Driving by their personal needs, the employees may develop different perceptions regarding the benefits of using an information system. Therefore, we treat perceived benefit as an individual-level antecedent of IS use continuance. Based on the personal experiences one has with the information system, one would develop expectation of the positive outcome to occur, which then affect his/her intention for further use of the IS. The positive impact on individual uses - perceived benefit - is defined as the degree to which an individual user perceives the use of the system enhances

his/her productivity and job performance (Davis, 1989; Rai, Lang, & Weker, 2002; Seddon, 1997). One would expect the likelihood of using the IS to increases when the employees have experienced a greater level of benefits from prior use of the IS. Thus, we predict:

H1*: User's perceived benefit of using the focal system is positively related to continuance usage of the IS.*

Adopting an information system may also create negative impact on employees, such as increasing their workload, job stress, or learning burden. The negative consequences could emerge, for example, when the information system involves changes in business process that generates additional job demands (Harley, Wright, Hall, & Dery, 2006). According to TAM (Davis, 1989), individuals tend to use the technology persistently when performing task if the technology is perceived as easy to use. Thus, increased workload could arise when the individuals have experienced difficulties of using the system, which hinder their enthusiasm to continue using the system. Other factors, such as anxiety of technology use, perceived complexity of the technology operation, and unsatisfactory performance, could lower the users' usage intention (DeLone & McLean, 1992; Meuter, Ostrom, Roundtree, & Bitner, 2000). Regardless of the causes, the prior research suggests that an individual's decision to use the information system will likely decrease if they perceive high workload has resulted from using it. Thus we postulate:

H2*: User's perceived load of using the focal IS is negatively related to continuance usage of the IS*

3.2 Organization-Level Predictors of IS Usage Continuance

Although prior studies have well documented the impact of IS characteristics (i.e., system quality and information quality) on IS usage continuance, the research has yet to investigate

these characteristics as organization-level factors that influence the IS usage behaviors of individual users. Prior studies have treated information and system quality as individual-level factors that are measured as individual perceptions of the system attributes (e.g., Nicolaou & McKnight, 2006; Rai, Lang, & Welker, 2002; Seddon, 1997). For other studies that focus on organization level as the unit of analysis, the researchers collected the data from the key informant(s) from the survey organizations to the two types of quality and their impact (e.g., Byrd, Thrasher, Lang, & Davidson, 2006; Wixom & Watson, 2001). In the present study, we conceptualize information quality and system quality as organization-level factors that refer to collective perceptions shared among the users of an organization with respect to a focal IS. This conceptualization reflects the organizational phenomena that have their theoretical foundation in the cognitive, affective, behavior, and characteristics of individuals (Kozlowski & Klein, 2000). In other words, we argue that the quality of information and system are phenomena manifesting at higher levels, which summarize the collective perceptions of an organization's members. We expect the two qualities of organizations' information systems differ insofar as the characteristics, experience, and values of organizational members differ.

Because individual action is limited by the surrounding context, making the admissible range of actions influenced by a multitude of the contextual factors (Cappelli & Shearer, 1991; Johns, 1991), we predict that information quality and system quality will affect an individual employee's continuance usage through two top-down processes (Kozlowski & Klein, 2000). First, information quality and system quality may have direct effects on the continuance use of the IS. Second, the two qualities as contextual factors may moderate the relationship and process between IS qualities and the continuance use of the IS at the individual level.

In the first top-down process, the collective perception of a focal IS's quality (i.e., information quality and system quality) has a direct effect on its individual users when the shared quality determines how the users of the organization use the system to collaborate, coordinate and

communicate with their co-workers. According to DeLone and McLean (1992), information quality and system quality directly affect system usage. Findings of several studies show a positive association between users' perceptions of a system's information quality as well as system quality and their system usage behaviors (Bharati & Chaudhury, 2004; Taylor & Todd, 1995). These arguments lead us to propose the following hypotheses:

H3: *Information quality of a focal IS is positively related to the user's continuance usage of the IS.*

H4: *System quality of the focal IS is positively related to the user's continuance usage of the IS.*

3.3 Cross-Level Moderation of IS Quality and Service-Oriented Citizenship Behaviors

Another top-down process through which the IS quality effects is by producing effect on the relationship between individual benefit/load and continuance use of the IS. According to Mischel, 1977), strong situations constrain the multitude of behaviors a person may be willing to or able to engage in whereas weak contexts leave the individuals more discretion in their behavioral decision. In this regard, the strength of negative relationship between perceived load and IS usage continuance at the individual level will decrease when the quality of the information and the system is high. Therefore, we develop the follow hypotheses.

H5a. *The negative relationship between perceived load and continuance use of the IS will decrease as the quality level of the information increases.*

H6a. *The negative relationship between perceived load and continuance use of the IS will decrease when the quality level of the system increases*

As previously mentioned, when users' perceived benefit is high, they tend to continue use of the IS. However, favorable IS quality sends signals to individual users that the advantages of IS are expected and supported, thereby creating a strong context for use of the information

system. That is, when the positive context is not present, users are more likely to rely on their personal consequence to direct their actions. In contrast, the benefit one receives as individual user may become less influential on decision to use the IS if the shared perception quality of the system is high. Thus, we predict:

> ***H5b***. *The positive relationship between perceived benefit and continuance use of the IS will decrease when the quality level of the information increases.*
>
> ***H6b***. *The positive relationship between perceived benefit and continuance use of the IS will decrease when the quality level of the system increases.*

Service-oriented organizational citizenship behavior

In addition to the IS quality, this situation may be influenced by other contextual factors, such as service from IS department. In organizations, IS department employees usually provide e-services or design IS for users, and they can be considered as service providers from an internal marketing perspective. However, service delivery behaviors frequently involve personal interactions. These interactions develop relationships with customers (users) that help employees understand customers' needs, may in some cases enable the service to be customized, and make customers feel important (Dimitriades, 2007). Indeed, customer orientation is important because service employees who exhibit a high degree of service orientation engage in behaviors that increase the satisfaction of their customers, and customer oriented behaviors lead to the development of long-term relationships between the organization and its customers that are beneficial to both parties (Dimitriades, 2007; Dunlap, Dotson, & Chambers, 1988). These customer-oriented behaviors are usually called service-oriented organization citizenship behaviors (SOCB) or customer-oriented organization citizenship behaviors (Bettencourt, Meuter, & Gwinner, 2001).

The definition of SOCB is from the concept of organizational citizenship behavior (OCB),

which is defined as a type of behavior of an organization's employees that is aimed at promoting the organization's effective performance, regardless of the individual productivity objectives of each employee (Organ, 1988). Thus, SOCB focuses on the behavior of service-contact employees, according to which customer-contact employees provide information about customer needs and suggest improvements in service delivery, so their organizational participation is fundamental to the firm (Bettencourt, Meuter, & Gwinner, 2001; Gonzalez & Garazo, 2006). Also, some empirical studies showed that SOCB is related to employee job satisfaction (Gonzalez & Garazo, 2006), customer satisfaction and unit sales (Groth, 2005; Schneider, Ehrhart, Mayer, Saltz, & Niles-Jolly, 2005).

In our research context, if IS department employees can exhibit SOCB to users, users' intentions to continue to use IS might be influenced by their IS service. For example, using IS may cause the users who never touched technology (or a computer) before to feel load, because they need to spend more time/cost to learn about it. If employees of an IS department performed SOCB or expressed support to users, then users' negative effect might be reduced (Love, Irani, Standing, & Themistocleous, 2007) and the users might be helped to deal with their emotional distress (Cheuk, Wong, & Rosen, 2000; Sadri, 1997). The SOCB in this study refers to the citizenship behavior from IS department employees when they provide services for IS users. Adopting a contingency theory view, we believe SOCB provided by an IS department is a situation factor, and we predict:

H7a. SOCB of IS department employees will alleviate the negative impact of individual load on continuance of IS usage.

Several studies demonstrated that the "strong" situational strength would constrain the effect of individual (e.g., personality) on performance (Liao & Chuang, 2004; Mischel, 1977), and may have an adverse effect on employees by limiting the influence on work-related outcomes (Peters & O'Connor, 1980; Phillips & Freeman, 1984). For instance, in Liao and

Chuang (2004)'s study, a positive service climate may help create a strong situation or a general service-promoting atmosphere through managers' commitment that constrains the expression of personality. As similar to Liao and Chuang's proposition, we suppose that users will ignore their perceived benefits while the organizations provide a high SOCB. While IS department employees provide nice services to users and actively help users, users will be willing to use IS, and motivating users' benefits (or personal incentives) on using IS might become less important. Therefore, we propose:

H7b. SOCB of IS department employees will diminish the positive impact of individual benefit on continuance of IS usage.

However, OCB is conceived as a global concept that includes all relevant positive behaviors of individuals within an organization (Castro, Armario, & Ruiz, 2004). It needs many employees to be involved in this procedure and then incrementally promotes an overall service climate in a group or organization. Thus, many researchers consider that OCB is a group-level or organization-level construct (Podsakoff & MacKenzie, 1994; Schneider, Ehrhart, Mayer, Saltz, & Niles-Jolly, 2005). Besides, one common limitation of prior investigations is their focus on OCBs that are widely applicable across different types of organizations and positions (Bettencourt, Meuter, & Gwinner, 2001). Due to this limitation, recent researchers started to apply HLM and calculate the organization-level factors aggregated from individual samples. The HLM approach will help researchers to measure the direct or indirect effect of organizational factors and overcome the probable differences between the organizations. Based on the above conditions, OCB is treated as an organization-level construct in this study. Figure 1 illustrates our research model and hypotheses.

4. Study Design and Data Collection

4.1 Participants and procedures

According to our research purpose, we surveyed the firms that have completed implementation and adoption of large-scale and cross-department IS, such as an ERP system. We contacted IS managers from 57 firms in Taiwan and confirmed whether the characteristics of their systems met our selection criteria. We found 50 qualified firms. All these systems had been purchased from software vendors or consulting firms but maintained by internal IS department employees. Since our research objectives were to understand the system users' behaviors of sustainability of IS success, we requested that the selected system users have previous direct experience in using the system and assessing the SOCB pattern of IS employees. In addition, the use of samples obtained from different sources (e.g. ordinary users and IS department employees) at multiple levels allows us to reduce common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

To ensure that there were enough respondents per organization to provide reliable estimates of organization-level variables, we mailed questionnaires to each organization with ten or more IS users for measurements of IQ and SQ and three or more IS employees for measurements of SOCB. With the colleagues' and managers' support, we obtained 495 users and 170 IS employees from 48 enterprises. After checking the within-organization agreement and reliability (r_{wg}), we excluded one organization because its r_{wg} is less than 0.7 (James, Demaree, & Wolf, 1993), and we had a final usable sample of 485 users and 166 IS employees from 47 enterprises. Of the users, 65 percent were female, 54 percent used IS over two years; the average age was 30.5 years, and tenure was 3.5 years. Approximately 34 percent of the users had frequent contact with IS employees during the periods of system usage. Of the IS employees, 68 percent were male, the average age was 30 years, and tenure was 3.3 years.

4.2 Measures

We obtained the items in the questionnaire either by adapting measures that had been validated by prior research or by developing measures by ourselves. These measures were pretested through two stages with samples of academics and managers. Three academics and five managers checked the scales for relevance and clarity of all items to ensure the face validity. For all measures, a 6-point Likert type scale was used, with anchors ranging from strongly disagree (1) to strongly agree (6). We describe the measures next (see Appendix 1).

Information quality (IQ) and system quality (SQ)

Information quality in this study is defined as the degree to which information attributes, such as content, accuracy, and format, meet the requirements of the user (DeLone & McLean, 1992; Seddon, 1997; Rai, Lang, & Welker, 2002). System quality is operationalized by the extent of the reliability, flexibility, and maintainability of the system (Li, 1997; Seddon, 1997). Five items for measuring IQ and five items for SQ are adopted from the study of Li (1997) and Seddon (1997). To assess IQ and SQ at the organization level, we aggregate individual users' perceptions of IQ and SQ in each organization as the overall measures.

User's perceived benefit and User's perceived load

User's perceived benefit is defined as the perception of individual users of the degree to which using a particular system has enhanced his job performance (Rai, Lang, & Welker, 2002). Four items measuring this construct are adapted from Rai et al. (2002). User's perceived load is defined as the perception of individual users of the degree to which using a particular system has increased job demands, expectations, and responsibilities (Caldwell, Herold, & Fedor, 2004). We adapted six items from the scales used by Caldwell et al. (2004).

Service-oriented organization citizenship behavior (SOCB)

Well-established scales were used for SOCB, which was measured with Bettencourt's scale (Bettencourt, Meuter, & Gwinner, 2001). SOCB contains three dimensions: (1) *Loyalty* is defined as the extent to which IS employees voluntarily mention the advantages of system services and encourage or recommend users to use them; (2) *Participation* is operationalized by the extent to which the IS employees take initiatives that improve service when communicating with users; and (3) *Service delivery* is defined as the extent to which IS employees effectively respond to user concerns and complaints. Thirteen items were assessed in this three-dimension construct. To measure the SOCB at the organization level, we averaged IS employees' evaluations of SOCB in each organization as the overall measures.

Continuance of IS usage

For our study, continuance of IS usage referred to the perceived degree to which the users after using the IS have positive evaluation and affective response. The two items from before the work of Seddon (1997) were adapted to assess this construct. An item is, for example, "I am pleased to use this system".

Control variable：Computer self-efficacy

Self-efficacy is the belief in one's ability to effectively complete a task or exhibit a specific behavior (Bandura, 1982), and computer self-efficacy is defined as the judgment of one's ability to use a computer (Compeau & Higgins, 1995). Over the past years, computer self-efficacy has been verified to be related to users' perceived usefulness and perceived IS ease of use (Igbaria & Iivari, 1995; Seyal & Rahman, 2007) and to further influences their use behavior (Lee, 2006; Wang, Wang, Lin, & Tang, 2003). More specifically, users with higher computing skills were significantly more satisfied than those with inferior skills with using information technology (Palvia & Palvia, 1999). Since our research design is based on IT system/service, the possible influence on users' computer ability and self-efficacy should be

considered, so we include this factor in our control variable.

5. Data Analyses and Results

The theoretical model in our study is multilevel in nature, including IQ, SQ, and SOCB at the organization level and user's perceived benefit and load at the individual level of analysis. In addition, the data are hierarchical and nested within different enterprises. Therefore, Hierarchical Linear Modeling (HLM; Bryk & Raudenbush, 1992) is the most appropriate analytical method to take into account the multilevel structures and is well suited for testing the type of cross-level interactions hypothesized here (e.g. Hypothesis 5a-7b). Building from advice by Hofmann and Gavin (1988), we grand-mean centered the individual-level predictors. This option for centering approach provides better estimates and interpretability with the HLM results, ensures that the lower level effects are controlled for during testing of the incremental effects of the higher level variables, and lessens multicollinearity in higher level estimation by reducing the covariance between the higher level intercept and slope estimates (Hofmann & Gavin, 1998; Raudenbush, 1989).

5.1 Measure validation

In the first phase, we conducted a confirmatory factor analysis (CFA) using AMOS 5.0 (Arbuckle, 2003) to validate the measurements. The analysis showed that most indicators loaded substantively (>.60) and significantly on their hypothesized factors (p<.001), while the composite reliabilities of all constructs exceeded the usual .60 benchmark (Bagozzi & Yi, 1988). Only two items were dropped from the perceived load and one item from SQ due to low factor loading. Furthermore, the average variance extracted (AVE) for the constructs were all greater than 0.50 and the squared root of AVE exceeds the correlations between all pairs of constructs (Fornell & Larcker, 1981) (see Appendix 1). Table 2 also reported the descriptive statistics and correlation matrix across all levels. The internal consistency reliabilities are

good, ranging from 0.80 to 0.94. In sum, the analyses provide support for reliabilities and validities for each construct.

Table 1. Means, standard deviations, and Intercorrelations for All Study Variables

Variable	Mean	S.D.	(1)	(2)	(3)	(4)
Individual-level						
(1) Perceived benefit	4.12	0.90	**0.92**			
(2) Perceived load	3.19	0.97	-0.02	**0.90**		
(3) Computer self-efficacy	4.07	0.85	0.11 *	-0.00	**0.90**	
(4) Continuance of IS usage	4.50	0.91	0.73***	-0.22***	0.18***	**0.92**
Organization-level						
(1) IQ	4.50	0.37	**0.90**			
(2) SQ	4.10	0.39	0.77 ***	**0.80**		
(3) SOCB	4.70	0.51	0.11	0.04	**0.94**	

Note. For Individual-level measures, $N = 485$; for organization-level measures, $N = 47$. Diagonal elements (in bold) are the Cronbach's α

*p<.05, **p<.01, ***p<.001

5.2 Aggregation of organizational-level variables

Our next step was to check the viability of the three organizational-level variables. Following James, Demaree, and Wolf (1984) and Kozlowski and Hults (1987), we accessed interrater agreement by computing r_{wg} values, which used uniform null distribution for these variables and obtained median values of 0.95 for IQ, 0.93 for SQ, and 0.93 for SOCB. These r_{wg} values were well above the conventionally acceptable value of 0.7 (James, Demaree, & Wolf, 1993). One-way ANOVA was performed to show that between-group differences are significantly higher than within-group differences for IQ (F=2.87, p<0.001), SQ (F=3.04, p<0.001) and SOCB (F=2.31, p<0.001). We then calculated the following values of the interrater reliability index (ICC1) and the reliability of group mean index (ICC2): IQ, 0.15 and 0.65; SQ, 0.16 and 0.67; and SOCB, 0.27 and 0.57, respectively. These values were comparable to the median or recommended ICC values of aggregated constructs reported in

the literature (see Schneider, White, & Paul, 1998). Only for the slightly low ICC(2) value of SOCB suggests that it may be difficult to detect emergent relationships (Bliese, 2000); however, it should deal with aggregation if aggregation is justified by clear theoretical foundations and supported by high $r_{wg(j)}$ and significant between-groups variance (Chen & Bliese, 2002; Kozlowski & Hattrup, 1992). On the basis of these results, we concluded that aggregation was justified and created our organization-level variables for IQ, SQ and SOCB.

5.3 HLM results for the antecedents of continuance of IS usage

Null model

Our hypotheses predict that both individual- and organization-level variables as well the interactions among them would be significantly related to continual usage of IS. In order for these hypotheses to be supported, there must be significant between-organizations variances in the outcome variables. Thus, using HLM, we estimated a null model in which no predictors were specified for either the individual- or organization-level function to test the significance level of the between-organizations variance in the outcomes by examining the significance level of the organization-level residual variance of the intercept ($\hat{\tau}_{00}$ = 0.10, p<0.001) and ICC1. The ICC1 was 0.13, indicating 13 percent of the variance in continuance of IS usage resided between organizations, and 87 percent of the variance resided within organizations. We thus proceeded to test our hypotheses using HLM.

For the HLM model estimated (see Table 2), we calculated the proportion of within-group variance explained by the model specification as compared with the null model ($R^2_{\text{within-organization}}$) and the proportion of between-groups variance explained by the model specification as compared with the null model ($R^2_{\text{between-organizations}}$). We also calculated the total variance explained in the outcome variable (R^2_{total}) by using the following formula (Bryk & Raudenbush, 1992), where ICC1 represents the proportion of variance in the corresponding outcome variable that

resided between organizations: $R^2_{total} = R^2_{within\text{-}organization} \times (1 - ICC1) + R^2_{between\text{-}organizations} \times ICC1$.

Testing individual-level predictors and cross-level interactions

Hypotheses 1 and 2 postulated that user's perceived benefit and load would be positively related to continuance of IS usage. We estimated an individual-level model including these variables, with no predictors specified for the higher level model. The individual-level analyses in table 2 show (see Model 1) that there is a significant relationship between the user's perceived benefit and continuance of IS usage (γ_{10}=0.70, p<0.001). In addition, the user's perceived load has a significant association with continuance of IS usage (γ_{20}= -0.17, p<0.001), after controlling for computer self-efficacy. Therefore, the findings support Hypothesis 3 and Hypothesis 4.

Testing IQ and SQ of organization-level predictors.

Hypotheses 3 and 4 predicted that the proposed factors (e.g., IQ and SQ) would contribute to continuance of IS usage. Results of the analysis reveal that, after controlling individual-level factors, IQ (β=0.09, n.s.) does not have significant effect predicting continuance of IS usage (see Table 2, Model 2). Corresponding to our prediction, the result indicate that SQ (β=0.26, p<0.005) has significant effect predicting continuance of IS usage. Hence, hypothesis 4 is supported by data, but hypothesis3 is not supported.

Testing cross-level interactions

Hypothesis 5a-7b posits that the organization-level variables will moderate the relationship between individual-level antecedents and continuance of IS usage. The HLM analyses summarized in Model 2 (see Table 3) provide evidence of Hypothesis 5a: IQ alleviates the negative relationship between individual perceived load and continuance of IS usage (γ_{21}=0.26, p<.05). To better understand the interaction effect found, we plot and display the

effect in Figure 2. The values for continual usage of IS were plotted at high and low levels of IQ. The slope of the line predicting continuance of IS usage from user's perceived load appears to be steeper for low IQ than for high IQ. This further supports our prediction in Hypothesis 5a with respect to IQ. Hypothesis 6a is not supported by the data (γ_{22}= -0.13, *p*>.05). The result indicates that Hypotheses 5b is not supported (γ_{11}=0.06, p>.05). Consistent with Hypothesis 6b, the result reveals that the relationship between the individual perceived benefit and continuance of IS usage is negatively moderated by SQ (γ_{12}= -0.30, p<.01). In Figure 3, the slope of the line for low SQ showing continuance of IS usage from user's perceived benefit appears to be steeper than for high SQ. This further explains the unexpected result in Hypothesis 6b with respect to SQ.

Hypothesis 7a does not have a significant moderating effect (γ_{23}= -0.06, p>.05). However, Hypothesis 7b is supported by our data; the result shows that SOCB negatively moderates the relationship between individual perceived benefit and continuance of IS usage (γ_{13}= -0.12, *p*<.05). Figure 4 shows that the slope of the line predicting continual usage of IS from user's perceived benefit appears to be steeper for low SOCB than for high SOCB. This further demonstrates the expected result in Hypothesis 7b with respect to SOCB.

These results of all the hypothesis tests are presented in Table 2. To further examine the robustness of the HLM results, we randomly selected two enterprises to understand and exclude them from the model 3 to validate the absence of sampling bias. This did not change the pattern of results, suggesting adequate model stability of the current study.

Table 2. Hierarchical linear modeling results

	DV：Continuance of IS usage			**Results**
	Model 1	Model 2	Model 3	

Individual-level				
Intercept (γ_{00})	4.48***	3.05***	2.98***	
Benefit (γ_{10})	0.70***	0.66***	2.16***	H1：Supported
Load (γ_{20})	-0.17***	-0.18***	-0.47	H2：Supported
Computer Self-efficacy (γ30)	0.08*	0.09*	0.08*	
Organization-level				
IQ (γ_{01})		0.09	0.10	H3：Not Supported
SQ (γ_{02})		0.26*	0.26**	H4：Supported
Cross-level				
Load × IQ (γ_{21})			0.26*	H5a：Supported
Load × SQ (γ_{22})			n.s.	H6a：Not Supported
Load × SOCB (γ_{23})			n.s.	H7a：Not Supported
Benefit × IQ (γ_{11})			n.s.	H5b：Not Supported
Benefit ×SQ (γ_{12})			-0.30**	H6b：Supported
Benefit × SOCB (γ_{13})			-0.12*	H7b：Supported
$R^2_{\text{within-organization}}$	0.60	0.61	0.59	
$R^2_{\text{between-organizations}}$	0.80	0.83	0.90	
R^2_{total}	0.62	0.63	0.63	
Model deviance	869.76	867.88	869.41	

Note. IQ= Information Quality；SQ= System Quality；SOCB= Service-oriented organization citizenship behavior；DV= Dependent Variable

*p<.05, **p<.01, ***p<.001

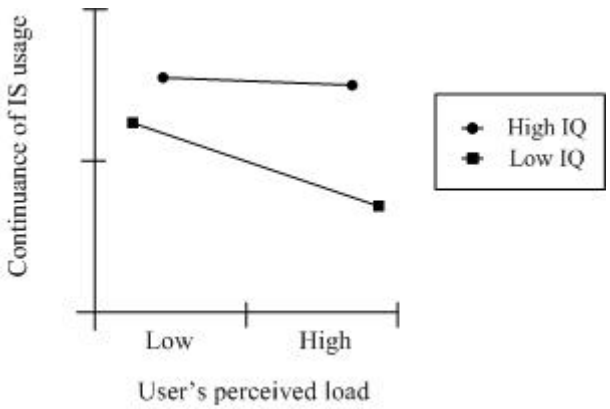

Figure 2. Relationship between user's perceived load and continuance of IS usage across levels of IQ

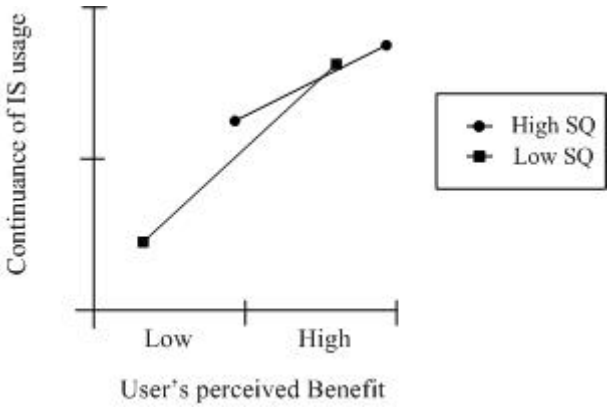

Figure 3. Relationship between user's perceived benefit and continuance of IS usage across levels of SQ

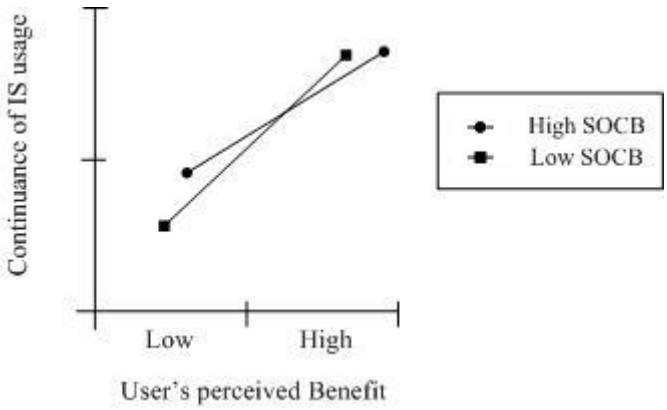

Figure 4. Relationship between user's perceived benefit and continuance of IS usage across levels of SOCB

6. Discussions

In summary, we predicted that organization-level factors (IQ and SQ) and individual-level factors (individual perceived benefit and load) would be associated with continuance of IS usage and that IQ, SQ, and SOCB would interact with individual-level antecedents to predict continuance of IS usage. Although we surely would have seen more significant results, given the complexity of our model, we feel the significant results we did find are of value to the research literatures and management communities in the following ways.

First, our data clearly support that the aggregated IQ and SQ have significant influence on continuance of IS usage. Prior studies have predominantly examined the linkage between IS

quality and users' behavior at the individual level (DeLone & McLean, 1992; Palvia & Palvia, 1999; Bharati & Berg, 2003; Nicolaou & McKnight, 2006). This study is the first to regard IQ and SQ as organization-level variables; the result of the analysis is consistent with the existing studies which have treated IQ and SQ as individual-level variables to influence the system usage (Davis, 1989; DeLone & McLean, 1992).

Second, users' perceived benefit and load can affect their perception toward continuance of IS usage. The results are consistent with past studies (e.g., Seddon, 1997; Rai, Lang, & Welker, 2002): Users are willing to continue their usage of IS if they perceive that IS can improve their job performance or work effectiveness. On the contrary, users will resist using IS if they perceive that IS will increase their workload and stress (DeLone & McLean, 1992; Meuter, Ostrom, Roundtree, & Bitner, 2000). However, the single aspect of perceived benefit or load could be investigated on IS in past studies (Davis, 1989; Ahuja & Thatcher, 2005). Our result indicates that the load of IS usage perceived by the users plays an influential role as important as the role of the benefit of IS usage. It reminds our understanding of the significant influence of users' perceived load that brings the negative impact on usage continuance of IS.

Third, aggregated IQ can alleviate the negative relationship between individual perceived load and continuance of IS usage. Proposing and examining the cross-level interaction effect is another important extension of ISS literatures, because this area of research has generally focused on the main effect. Our results suggest that the chance for users to continue using the IS may be increased when the negative effect of individual perceived load are offset by improvement of the organization-level IQ. Therefore, it is important for the organization's system to provide high IQ, such as real-time and relevant information, so as to effectively offset the negative effect of perceived load of IS usage.

Forth, we found a few significant cross-level effects for SQ and SOCB that were in the identical direction of what we would expect: Organization-level SQ and SOCB had a *negative* interaction with user's perceived benefit when predicting continuance of IS usage. From the

perspective of substitute effect, the current study reveals that personal benefit becomes less important and the users will continue using IS when the perceived SQ or SOCB within the organization is high than when it is low, implying a moderating role for SQ or SOCB. This concept of substitution from benefit to SQ or SOCB would be valuable in expanding the existing literatures.

Finally, our results have some methodological strengths increase the confidence while we provide the starting point of multilevel for investigating the IS areas. First, we acquired information form two distinct sources to assess the causal relationship, avoiding the treat of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Second, key person who we assigned to collect their responses randomly selected user respondents to provide the evaluations and to reduce selection bias in this regard. Third, the study was conducted by HLM to clearly interpret the hierarchical nature of our model and data.

6.1 Managerial Implications

The primary contribution of this work is two-fold. First, we extend the IS success model proposed by DeLone & McLean (1992) and empirically revisit the relationships among antecedents of continuance of IS usage synthesizing the multilevel perspectives and also integrating the contingency theory and situational theory. The focus of this integration is on the complexities of the organizational context within which individuals with influential characteristics from multiple levels. Our study represents a first step to bridge the gap between the macro and micro approaches with respect to continuance of IS usage. Second, we take substitute perspectives into account when most organizational managers face the condition that they possess limited resources. Indeed, the mixed results support our viewpoint and reveal the substitute effect or relationship between organizational and personal factors that influence the continuance of IS usage. We find the level of IS quality and SOCB are useful predictors to effectively decrease the influence effect of individual's beliefs and to further sustain users

behaviors toward continuance usage. Under the condition of finite resources, we essentially suggest that managers can concentrate the attention on improvement or reinforcement of the organization-level factors toward IS usage continuance and maximize the utility of their resources at the same time. These results will refine our understanding of individual perception and behaviors toward information system as it continues to pervade organizations at an accelerating rate.

We have several important findings in this study and they lead to important recommendations to IS management. One of our findings indicates that users are willing to continue using the system when they perceive a high level of IS quality. This implies that IS managers should keep IS quality in mind even if they are successfully implementing the system. If the levels of IQ and SQ begin to decrease, remedial actions (such as information update and system maintenance) should be taken to improve the IS quality. In addition, continuance of IS usage is influenced not only by users' perceived benefit but also by users' perceived load. Managers should listen to users' opinions or regularly evaluate their performance in order to understand the perception of users' load because their perception can significantly hinder their usage continuance and seriously jeopardize the sustainability of IS success.

Another finding suggests that a high level of IQ can mitigate the negative impact of the users' perceived load on the IS usage continuance. With respect to their effect on continuance of IS usage, this accounts for that if users' perceived load increases, managers should try to enhance the levels of IQ so as to help users effectively resolve workload-related stress, thus reducing individual's negative perception derived from the system. Furthermore, the positive relationship between the users' perceived benefit and continuance of IS usage can be weakened by the high level of SQ. This insight raises the possibility that users' perceived benefit and SQ might be effective substitutes for one another. When the level of SQ is high, users' perceived benefit may be less significant for using IS than when the level of SQ is low.

It is very important for managers to improve the levels of SQ (e.g. providing a reliable system or satisfying users' functional needs) to enable users to have a greater tendency to continue using IS. If the organization's system can provide high SQ to support users' job assignments, the impact of individual benefit on the system use would not make any difference. In sum, the high quality of the organization's system can effectively weaken the influence of personal load and benefit on users' continuance usage of IS.

Similar the substitute effect to SQ, a high level of SOCB from IS department employees can weaken the positive relationship between the users' perceived benefit and IS usage continuance. When the level of SOCB is high, users' perceived benefit may be less to be considered for continuance of IS usage than when the level of SOCB is low. The implication suggests when the IS department embraces the spirit of cooperation and altruism, users will care less about their individual benefits and are more willing to contribute to the sustainability of IS success. Therefore, managers should employ ways to promote SOCB of IS employees, such as generating trust in the workplace or creating a harmonious climate through education and training, etc.

6.2 Conclusion and Future Research Directions

Although we have ensured the absence of potential bias common to survey studies, our study has some limitations. First, we did not explore the differences in IS usage model between different industries. It is possible that other important factors may exist in different industries, such as profit and non-profit organizations. Therefore, we call for future research to investigate how industry-specific factors (e.g., reward system or technological capability) may influence the relationship between these predictors and continuance of IS usage. Second, there may be other antecedent constructs to affect the continuance of IS usage should be detected, such as individual-level predictors of personal motivation or perceived justice and organizational-level factors of management support and climate within workplaces. Third, our

survey assessed participants' self-reports within one time period; namely, it is a cross-sectional study to examine the individual behaviors and organizational factors. Users' behavior to use organization's system is an ongoing process. Therefore, future research should repeat our study to perform a longitudinal analysis and increase the generalization of the results.

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Appendix 1

Construct Measures and Scale Assessment

Description of construct items	Loadings
Information Quality：CR=0.900；AVE=0.645	
IQ1. The information that the system provided is accurate.	0.875
IQ2. The information that the system provided is reliable.	0.876
IQ3. This system can provide the real-time information	0.776
IQ4. The information that the system provided is complete.	0.798
IQ5. This system provides appropriate information I need.	0.676
System Quality：CR=0.800；AVE=0.502	
SQ1. This system is flexible according to changes in circumstance and requirement.	0.649
SQ2. This system is stable and always running.	0.749
SQ3. This system responds quickly when I use it.	0.742
SQ4. This system is easy for me to use.	0.690
***User's perceived load*：CR=0.897；AVE=0.688**	
PL1. After using this system, I am expected to do more work than I used to.	0.692
PL2. After using this system, my job responsibilities increased.	0.878
PL3. After using this system, my work demands increased.	0.929
PL4. After using this system, my job-stress increased.	0.799

***User's perceived benefit*：CR=0.919；AVE=0.740**

PB1. Using this system can improve my job performance.	0.760
PB2. Using this system can increase my work effectiveness.	0.927
PB3. Using this system can make my job easier.	0.916
PB4. This system is useful in my job.	0.827

***Continuance of IS usage*：CR=0.921；AVE=0.854**

CU1. I am pleased to use this system.	0.964
CU2. I strongly recommend others to use this system.	0.883

Computer Self-efficacy：CR=0.903；AVE=0.700

I could complete the job using the new software package,

SE1. …….if there were no one around to tell me what to do.	0.763
SE2. …….if I had only the software manuals for reference.	0.882
SE3. …….if I had a lot of time to complete the job.	0.842
SE4. …….if I had just the built-in help facility for assistance.	0.856

Organization citizenship behavior

Loyalty：CR=0.927；AVE=0.761

LO1. IS employees actively explain how to use system and how it benefit my job.	0.898
LO2. IS employees actively mention the advantages of this system.	0.879
LO3. IS employees encourage me to use this system.	0.843
LO4. IS employees actively promote this system for users.	0.869

Service delivery：CR=0.811；AVE=0.521

SD1. IS employees provide the related services in following the guidelines of internal-service process.	0.629
SD2. IS employees solve user system problems immediately.	0.823
SD3. IS employees hardly making mistakes in coping with system requirements (problems).(need to double check the original item for its exactly meaning)	0.617
SD4. IS employees are courteous to everyone, no matter what the situation is.	0.794

Participation：CR=0.922；AVE=0.703

PA1. IS employees provide many ideas during the system promotion period.	0.849
PA2. IS employees provide suggestions which relate to system improvement.	0.838
PA3. IS employees provide solutions when users meet system problems.	0.786
PA4. IS employees courteously provide their services.	0.746
PA5. IS employees actively take effort on service promotion.	0.849