System Emergent Use: A Theoretical Model and Empirical Exploration

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ABSTRACT

Complex information systems have become the core component of modern organizations. Corporate investments in complex information systems have soared to a record high. Unfortunately, half of these initiatives are unsuccessful, and it is also the case that firms that implemented complex information systems rarely fully materialize the touted benefits and return on investment. This underachievement may partially be attributed to system underutilization. In this study, we approach this issue from the perspective of emergent use. Emergent use denotes the extent to which an individual uses a technology in an innovative manner to support his/her work tasks. Drawing upon the individual IS continuance model and organizational assimilation framework, we developed a model to theoretically understand those factors that drive employees' emergent use of complex information systems, particularly when there is an organizational mandate to use it. A field study was conducted in two large manufacturing firms using ERP systems to empirically validate the model. The results suggest that factors informed by direct experience prior to post-acceptance, specifically perceived usefulness and satisfaction, strongly affect emergent use. Contrary to commonly accepted knowledge in IS implementation, general management support has little impact on emergent use behavior post-acceptance. Instead, personal trait, such as personal innovativeness with IT, exerts significant influence on emergent use. This study represents an important first step toward understanding emergent use in

organizational contexts. The findings advance our understanding of emergent use and identify key factors for managers to formulate effective interventions for planned outcomes.

Keywords:

Technology Adoption, Technology Diffusion, Emergent Use, Post-acceptance, IS Implementation, Innovative Usage

INTRODUCTION

Since organizations are depending more on information systems (IS) to gain and sustain their competitive advantages, their investments in new information technologies (IT) have increased rapidly. For example, organizations spent $20 billion on enterprise resource planning (ERP) system adoption and implementation in 2000 (Willcocks & Sykes, 2000). Such investments increased to $26.7 billion in 2004, and are expected to rise to $37 billion in 2008 (Kawamoto, 2004). It is very common for large organizations to spend over $100 million on implementing ERP systems (Robey, Ross, & Boudreau, 2002; Seddon, Shanks, & Willcocks, 2003). Adopting and implementing complex information systems like ERP or customer relationship management (CRM) represent strategic decisions that demand tremendous organizational resources. However, results of these initiatives are rather disappointing. About half of the organizations that adopted complex information systems experienced implementation failures (Adam & O'Doherty, 2003; *Economist*, 2002). It is also rare to find cases where these organizations have used their systems to their fullest potential and realized the promised return on investment. It is recognized that most complex information system failures are due to behavioral rather than technical issues (Forester, 1989; Regan & O'Connor, 1994).

Vendors of CIS, such as ERP, make promises, and organizations act on the belief that they will benefit from the capabilities of the systems. However, these advertised benefits are equally available to competitors who also adopt the IS. In this vein, the unique competitive advantages of

implementing ERP can only flow from benefits beyond those originally envisioned by the vendors. An important way to derive further competitive advantage is to find new ways to creatively use the system, or emergent use. *Emergent use*, in this study, is defined as using a technology in an innovative manner to support an individual's tasks and enhance his/her productivity. Emergent use can stimulate high productivity, generate high value-added goods and services, and ultimately enhance organizations' ability to compete in the knowledge-driven economy (Bhattacherjee & Premkumar, 2004; DeLone & McLean, 1992).

Several theories have been developed to explain individual adoption and acceptance of IS. Among these are Diffusion of Innovations (Rogers, 2003), the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989), and the Theory of Planned Behavior (Ajzen, 1985; Taylor & Todd, 1995). In this paper, adoption refers to the decision to make use of a technology (Rogers, 2003). Acceptance stands for initial technology usage after adoption (Bhattacherjee, 2001). These traditional innovation adoption and acceptance models fits well for a particular range of scenarios and technologies, that is, individuals voluntarily decide whether to use an "individual and simple use" technology, such as PCs or spreadsheets (e.g., Adams, Nelson, & Todd, 1992; Brancheau & Wetherbe, 1990; Davis, 1989; Szajna, 1996). On the other hand, there are increasingly more organizations adopting complex information systems that cut across functional and organizational boundaries (Amoako-Gyampah & Salam, 2004; Legris, Ingham, & Collerette, 2003). Given the sheer scale and complexity of such information systems, its implementation usually bears significant business consequences (Chattacherjee, Grewal, & Sambamurthy, 2003). In addition, it should be noted that employees' usage behavior in organizational contexts is often mandated. However, few theoretical explanations are available for the mandatory use of organizational information

systems, especially for emergent use in the post-acceptance stage. The thorny issue of understanding exactly what it takes to foster the emergent use of complex information systems in organizations is necessary in order to maximize return on information systems investment.

IS adoption within organizations is best viewed as a two-stage process: the primary adoption by a firm, division, or department and the secondary adoption by employees. Employees' adoption and acceptance (initial usage) (Bhattacherjee & Premkumar, 2004; Jasperson, Carter, & Zmud, 2005) is the prerequisite for effective use. Effective use, in turn, can bring about maximum benefits from the system (Boudreau, 2003). Evidence for this link from extant research on learning curves suggests that, by using technologies, workers often obtain utility that exceeds the maximum capacity indicated by technology providers (Dutton & Thomas, 1984). Although they have to use the installed system, employees can decide the extent of their usage and effort. That is to say, IS can be used either narrowly or broadly, in ways that expand the capacities of the technologies (Carlson & Zmud, 1999).

Although much of the past diffusion research has focused on the frameworks related to implementing information systems into organizations, employees' usage issues, especially in various organizational contexts, have not received sufficient attention. In essence, emergent use can be viewed as post-acceptance behavior that involves creatively using a technology to support his or her tasks. Key factors that influence an individual's desire and behavioral attempts to use an information system to its fullest potential and even use it innovatively may differ from those for initial usage. The shift towards examining "emergent use" implies that extant adoption models dealing with factors and processes need to be revisited.

Meanwhile, the notion of emergent use was first offered by Saga and Zmud (1994). They referred to emergent use as using an IS in order to accomplish work tasks that were not feasible

or recognized prior to the application of the technology to the work system. Some researchers have realized the importance of emergent use and proposed related concepts. For example, focusing on post-adoptive behaviors, Jasperson et al. (2005) proposed the concept of "individual feature extension," which stands for individual discovering ways to apply features that go beyond the uses delineated by the application's designers or implementers. Nambisan, Agarwal, and Tanniru (1999) examined the significance of "intention to explore" to use IT efficiently. "Intention to explore" reflects a user's willingness and purpose to explore a new technology and identify its potential use. Agarwal (2000) argued that the intention to explore is similar in spirit to the concept of emergent use. Ahuja and Thatcher (2005) further introduced "trying to innovate with IT" as a means to examine IS post-acceptance use, especially in a work environment. "Trying to innovate with IT" refers to a user's goal of finding novel uses for information technologies (Ahuja & Thatcher, 2005). Conceptually speaking, the aforementioned concepts all concern using an information system innovatively. Some link technology use to task performance, while others do not. To faithfully capture emergent use in the organizational context, the system usage construct widely used in technology adoption and acceptance research needs to be carefully reconceptualized. Melone (1990) argued for a reconceptualization of the system usage construct to describe the "performance-related" usage behaviors that reflect how IT is actually used in organizations. In light of the innovative nature of emergent use and the emphasis on organizational contexts, this paper refers *emergent use* as using a technology in an innovative manner to support an individual's task performance.

The present study examines the determinants that affect individual employees' emergent use of complex information systems, in particular when there is an organizational mandate to use the systems. The main objectives of this paper include (1) investigating a theoretically-grounded

model that explains post-acceptance emergent use behavior, and (2) providing insights into leverage points that managers can employ to facilitate system implementation to eventually enhance organizational performance. The paper proceeds as follows. First, this study proposes a theoretical model of IS emergent use and ensuing hypotheses. Second, the research methodology and data analysis technique are described and results of the study are discussed. Finally, this paper concludes with a summary of limitations and a discussion of theoretical and practical contributions and implications.

THEORETICAL FOUNDATIONS AND RESEARCH HYPOTHESES

Theoretical Foundations

The focus of this study is post-acceptance behavior, particularly IS emergent use within mandatory organizational settings. Beyond the often-studied technology acceptance, managers also care about how extensively and creatively a technology is used by employees. Emergent use occurs at the post-acceptance stage and is critical to system effectiveness (Zhu & Kraemer, 2005). To attain IS emergent use, it is necessary for users to achieve continued usage, and then gradually go into an infusion stage to explore and find how to creatively use the system. In this vein, we propose a research model that synthesizes the **IS continuance model** and the **organizational assimilation framework**. While the IS continuance model taps into the aspect of sustained usage, the organizational assimilation framework captures the extent to which individuals use complex information systems.

From the individual perspective, Bhattacherjee (2001) developed the IS continuance model (Figure 1), which is well suited for post-acceptance behavior. The IS continuance model posits that users' intention for continued usage is determined primarily by their satisfaction with usage in prior stages. User satisfaction, in turn, is informed by perceived usefulness and confirmation

of expectation following actual use. The model also posits that perceived usefulness is expected to directly influence IS continuance intention. In addition, the extent of users' confirmation of expectation is positively associated with their perceived usefulness of IS use.

Insert Figure 1 about here

Since emergent use occurs at the post-acceptance stage, the IS continuance model serves as an ideal theoretical foundation. However, we employed emergent use, instead of continuance intention as the key dependent variable. This is justified by the following rationales. First, employees' system usage is usually compulsory in organizations. Some researchers have indicated that behavioral intention may not fully account for behavior if the behavior is mandated (Nah, Tan, & Teh, 2004; Rawstorne, Jayasuriya, & Caputi, 1998). Furthermore, it is not continuance intention but emergent use that is the phenomenon of interest. Although continuance intention may help explain "continued" usage, it may not necessarily explain the innovative and explorative use behavior.

The research model of employees' emergent use is presented in Figure 2. Based on the IS continuance model (Bhattacherjee, 2001), IS emergent use is affected by perceived usefulness and satisfaction with IS use. Confirmation of employees' expectation about the information system impacts IS emergent use indirectly through perceived usefulness and satisfaction. Perceived usefulness also indirectly influences IS emergent use via satisfaction.

In the meantime, the organizational assimilation framework also sheds light into the emergent use phenomenon from the organizational point of view. Assimilation denotes a series of stages to describe how deeply an information system penetrates the adopting firm (Gallivan, 2001; Zhu, Kraemer, & Xu, forthcoming). There are two assimilation stages following acceptance—routinization and infusion (Cooper & Zmud, 1990). In the routinization stage, an

information system becomes an integral part of the organization. While in the infusion stage, the information system becomes deeply and comprehensively embedded within organizational processes (Saga, 1994). The assimilation process can be influenced by organizational, group, and individual factors (Gallivan, 2001). In organizational contexts, employees' secondary adoption is often mandated by senior managers (Gallivan, 2001; Jasperson et al., 2005). In addition, information systems within organizations are usually complicated and interdependent among employees (Pozzebon, 2002). Specialized training to learn the principles of the system is required (Lippert & Forman, 2005) and peer's influence is often inevitable (Gallivan, 2001). Management support and social influence are therefore included to reflect these organizational dynamics. Meanwhile, employees' emergent use may also be associated with personal characteristics. The research model captures these individual attributes by incorporating the concepts of Computer Self-Efficacy and Personal Innovativeness with IT.

Insert Figure 2 about here

Research Hypotheses

The presented research model rests on the combination of the post-acceptance model of IS continuance and the organizational assimilation framework. IS continuance model suggests that the post-acceptance behavior is influenced by attitudinal considerations and perceived usefulness. The organizational assimilation framework, on the other hand, proposes that employees' secondary adoption is influenced by managerial interventions and other influences from colleagues or employees themselves. These important factors inform the development of the following hypotheses.

At the post-acceptance stage, confirmation of expectation and perceived usefulness are two important cognitive beliefs (Bhattacherjee, 2001). Confirmation is the extent to which their

expectation is confirmed (Bhattacherjee, 2001). Conversely, disconfirmation occurs when actual performance is lower than expected performance (Szajna & Scamell, 1993). Confirmation is positively related to satisfaction with IS use because it implies realization of the expected benefits of IS use.

Hypothesis 1a. Confirmation of expectation has a positive effect on satisfaction.

Additionally, confirmation can affect perceived usefulness in the post-acceptance stage (Bhattacherjee, 2001). During the acceptance stage, since users have little information about the new system, they are unsure what to expect from system usage. Under this circumstance, they may have low initial usefulness perceptions of the technology (Bhattacherjee, 2001). These low initial usefulness perceptions are easily confirmed after direct interaction with the system. Such perceptions may be adjusted higher as they become more knowledgeable about the system. Nonetheless, users may experience cognitive dissonance or psychological tension if their actual usage violates earlier usefulness beliefs. Users often have the tendency to adjust their perceptions to be consistent with reality. In other words, confirmation can elevate perceived usefulness.

Hypothesis 1b. Confirmation of expectation has a positive effect on perceived usefulness.

Social influence describes individuals' beliefs about important others' expectation regarding their secondary adoption. The particular influence may vary for a given innovation context. However, social influence shapes potential adopters' beliefs about when and why to adopt, and how much effort to undertake to learn the new system (Lewis, Agarwal, & Sambamurthy, 2003). When an important referent thinks they should use a system, potential adopters often incorporate the referent's belief into their own belief structure. If a supervisor or co-worker suggests that a particular system is useful even if they have not felt this way during the acceptance stage, they may later accept the idea that the system is useful (Rice & Aydin,

1991; Venkatesh, Morris, Davis, & Davis, 2003). They expect to experience the system's usefulness after using it in an appropriate way. In addition, if the system is used by co-workers, users are more likely to believe in and feel its importance and relevance (Fulk, Schmitz, & Steinfield, 1990). Hence the following hypothesis:

Hypothesis 2. Social Influence has a positive effect on perceived usefulness.

The most proximate influences on individual cognitive interpretations and performance of using information systems are individual-related factors (Lewis et al., 2003). Among these factors, computer self-efficacy and personal innovativeness with IT are the two constructs that have received consistent support as important predictors.

Self-efficacy is defined as beliefs about one's ability to perform a specific behavior (Bandura, 1977). From the perspective of social learning theory, computer self-efficacy can be viewed as an important antecedent to IS use to the extent that it fosters both the adoption of a new behavior and its maintenance (Compeau & Higgins, 1995a). The inclusion of computer self-efficacy is pivotal to the recognition that IS adoption and implementation is not just about convincing people of the benefits to be derived from using IS, but also the requisite skills and confidence. Newly introduced systems are often based on complex technologies that pose a high knowledge burden and are difficult for end users to grasp (Attewell, 1992; Fichman, 1992; Gattiker & Goodhue, 2005). In such cases, the end users' confidence in their ability to learn and use complex information systems effectively can be critical to emergent use and successful implementation. Furthermore, Compeau and Higgins (1995b) argued that computer self-efficacy influences outcome expectation, such as perceived usefulness, suggesting that individuals with higher confidence levels may be more capable of appreciating the benefits of usage. Based on the above discussion, we state the following hypotheses:

Hypothesis 3a. Computer self-efficacy has a positive effect on emergent use.

Hypothesis 3b. Computer self-efficacy has a positive effect on perceived usefulness.

Personal innovativeness with IT denotes the degree to which an individual is willing to try out any new IT (Agarwal & Prasad, 1998). It is treated as an individual propensity associated with more positive beliefs about technology use. Individuals with higher personal innovativeness with IT may develop more positive perceptions about IS innovations (Agarwal & Prasad, 1998). Earlier diffusion research identified individuals as innovative if they are early to adopt an IS innovation (Rogers, 2003). Thus, people with higher IT innovativeness are supposed to be more innovative in the domain of information technologies (Lewis et al., 2003). In addition, personal innovativeness with IT could potentially affect how individuals respond to IS innovations (Agarwal & Prasad, 1998). Personal innovativeness with IT also characterizes the risk-taking propensity that exists in innovators. Innovators are suggested to be able and willing to cope with higher levels of uncertainty (Rogers, 2003). They may have the tendency to explore more new ways of using IT, rather than relying on standardized routines. As a result, individuals who are more innovative toward IT may be more likely to creatively use a complex information system to enhance their job performance.

Personal innovativeness with IT helps us to further understand the mechanism that forms perceptions and the role that an individual dispositional system plays in the implementation process (Agarwal & Prasad, 1998). IT innovators are more likely to embrace IS innovations, explore the system, and appreciate the usefulness of the system than those who are less innovative.

Hypothesis 4a. Personal innovativeness with IT has a positive effect on emergent use.

Hypothesis 4b. Personal innovativeness with IT has a positive effect on perceived usefulness.

Management support refers to the ways organizations encourage system usage and the degree to which they provide necessary resources to facilitate system implementation. Management support includes management encouragement (Igbaria, 1990) and such activities as mandating usage, offering training, and providing expert support when needed (Gallivan, 2001). These activities bear important implications for secondary adoption, as substantial resources are required for not only system development but also implementation.

Support and supervision of end users during the implementation process may contribute significantly to implementation success (Bhattacherjee, 2001). During this process, managers need to work closely with end users to mandate, negotiate, persuade, motivate, and support their adoption and usage. In addition, management support is crucial for changing existing routines and processes that are essential for employees' usage and successful implementation in organizations (Purvis, Sambamurthy, & Zmud, 2001). Management support appears to be a facilitating condition for emergent use. We therefore expect that:

Hypothesis 5a. Management support has a positive effect on emergent use.

On the other hand, perceived usefulness also plays an important role throughout the implementation process (Bhattacherjee, 2001; Davis et al., 1989). Organizational interventions, such as user training and technical support, are instrumental in understanding the system and facilitating users to develop realistic expectation for implementation success (Davis et al., 1989; Ives & Olson, 1984; Lucas, Ginzberg, & Schultz, 1990). High levels of training and technical support can promote favorable beliefs about the system among employees (Igbaria & Chakrabarti, 1990; Lucas, 1978). Moreover, management support reflects the formal stance of an organization toward IS usage, providing clues about the plausible consequences of using the system. Such a signal may also foster positive outcome evaluations.

Hypothesis 5b. Management support has a positive effect on perceived usefulness.

Technology acceptance research has shown that perceived usefulness is the salient belief influencing individuals to accept an IS. Previous studies have also revealed that perceived usefulness impacts individuals' affect substantively across innovation stages (Davis et al., 1989; Karahanna, Straub, & Chervany, 1999). While attitude and satisfaction both represent individual affects, satisfaction can be conceived as a post-acceptance affect (Bhattacherjee, 2001; Bhattacherjee & Premkumar, 2004). Moreover, as perceived usefulness influences attitude affect during acceptance, perceived usefulness is expected to be the salient ex post expectation that influences satisfaction affect at the post acceptance stage (Bhattacherjee, 2001).

Hypothesis 6a. Perceived usefulness has a positive effect on satisfaction.

Perceived usefulness at the acceptance stage directly motivates usage intentions because of its high instrumental consideration. Perceived usefulness at the acceptance stage is typically based on others' opinions or information disseminated through the mass media or social networks (Bhattacherjee, 2001). At the post-acceptance stage, perceived usefulness is formed mostly through users' first-hand experience and is, therefore, more reliable (Bhattacherjee, 2001). In addition, in organizational contexts, employees' secondary adoption and usage are often obligatory. Employees' system usage may be mandated by the organization through rewarding incentives or punishment threats. To receive rewards or avoid punishment, employees are more likely to explore how to use the system in a sophisticated and efficient way to enhance their performance. Thus, perceived usefulness at the post-acceptance stage may also motivate employees' emergent use.

Hypothesis 6b. Perceived usefulness has a positive effect on emergent use.

Satisfaction is an experience-based affect (Oliver, 1980). In organizational contexts, if

employees are satisfied with their direct interaction with the system, they are more likely to embrace it, and attempt to use it creatively and efficiently. IS literature has also consistently supported the strong association between user satisfaction and usage behavior (e.g.,Bhattacherjee, 2001; DeLone & McLean, 1992, 2003; Seddon, 1997). This leads to the following hypothesis:

Hypothesis 7. Satisfaction has a positive effect on emergent use.

RESEARCH METHODOLOGY

To empirically test the research model and hypotheses, a cross-sectional field study was conducted in two large manufacturing firms using complex information systems. This section describes the operationalization of constructs, the survey sample, and the data collection procedure.

Measures

The research model has eight constructs, all of which were operationalized using multi-item scales. These measures were adapted from established scales in prior research. For confirmation of expectation, perceived usefulness, and satisfaction, we turned to the ones previously operationalized in the IS continuance model (Bhattacherjee, 2001). Personal innovativeness with IT was measured using the four items developed by Agarwal and Prasad (1998). Following Gallivan, Spitler, and Koufaris (2005), a portion (six) of the ten items developed for computer self-efficacy by Compeau and Higgins (1995b) were adapted to control the length of the instrument. Similarly, we adapted six of the eight items by Igbaria (1990) for management support. Although the notion of emergent use was discussed in extant literature, no established measurement was available. Two most related concepts, “Trying to innovate with IT” (Ahuja & Thatcher, 2005) and “Intention to Explore” (Karahanna & Agarwal, 2003; Nambisan et al., 1999), capture individual intention to use IS innovatively. Three items were adapted from

these constructs with the emphasis on actual innovative usage behavior that supports individual task performance.

Data Collection

Information systems are general concepts. Different industries and organizations use different systems, and different systems provide different functions. Given our research attention on emergent use of complex information systems in organizational contexts, we focus the investigation on the usage of ERP systems. An ERP system can be viewed as an enterprise-wide information system that integrates all aspects business processes. Because an ERP system touches a wide variety of a company's internal and external operations, its successful deployment and effective use are critical to organizational performance and survival. However, ERP implementations are both complex and challenging (Gattiker & Goodhue, 2005). The complexity of ERP systems suggests that knowledge learned in simple technology implementation environments may not be readily applied to the ERP contexts (Amoako-Gyampah & Salam, 2004). Unlike traditional and simple information systems, ERP systems are essentially sophisticated and represent a completely different class of IT application.

Given our focus on employees' emergent use, we directly targeted usage behavior at the post-acceptance stage. To do so, the scope of this study was confined within ERP systems that were initially adopted by senior management and then needed to be diffused and infused throughout the organizations. The unit of analysis is end-users of an ERP system within organizations. Furthermore, to ensure the mandatory context, system usage has to be mandated with respect to all participants. All firms participated in this study locate in the Guangzhou city, the center of the greater Pearl River Delta region – the regional powerhouse of the Chinese economy (Enright, Scott, & Chang, 2005).

The data collection includes three steps: (1) the questionnaire translation into Chinese and then its back-translation into English to ensure accuracy of translation, (2) the pilot study, and (3) the field survey. Since the original measures were operationalized in English, the conventional method of back-translation (Brislin, Lonner, & Thorndike, 1973) was applied to translate the measures into Chinese. The translator was a professional in the practice with college education in translation.

Next, a pilot study was performed to preliminarily ensure construct validity and reliability. One large organization was first contacted. The translated instrument was pretested with eighteen employees to identify any item they found ambiguous or difficult to understand. In addition, four IS professors were consulted for comments on the instrument, and minor modifications were subsequently made. The revised instrument was then distributed to seventy-nine employees in three other organizations using ERP systems as a second round test of the pilot study. This study followed the pretest procedures conducted by Gefen, Karahanna, and Straub (2003). The convergent validity of each scale was verified with a principal components analysis (PCA). A separate PCA was performed for every construct. A single eigen-value higher than one for every construct supported convergent validity. Due to the small sample size at this stage, discriminant validity could not be assessed at this stage (Hair, Anderson, Tatham, & Black, 1998). The instrument's reliability was evaluated using Cronbach's alpha (Nunnally, 1994). The construct alpha values ranged from 0.62 to 0.97. The revised instrument exhibited an acceptable level of reliability.

The official field survey was later administrated to two large manufacturing firms in the same area. Two large manufacturing firms that had implemented ERP systems for more than one year were selected. The ERP systems they deployed were offered by the same top-ranking ERP

solution vendor in the world. We put our focus on large enterprises in the manufacturing industry because these enterprises tend to have sufficient resources and ERP systems are widely used in this industry. Based on the study conducted by Boudreau (2003), 15 months following the implementation, the ERP system installed in an organization has not being used in its full potential. Because there is no general information about the time frame to attain system emergent use, it would be expected that one year may be an appropriate time period for an enterprise to progress to the post-acceptance stage. With the support of the CEOs and CIOs from these organizations, 230 employees in one organization and 220 employees in another were randomly selected from different departments to participate in the research. Of the 450 questionnaires distributed, 401 were returned. After excluding sixteen incomplete responses, 385 surveys were usable for analysis, resulting in an effective response rate of 85.6 percent. Table 1 presents the demographic characteristics of the survey sample. Data pooling was justified in that there were no significant differences between the two firms in their key independent and dependent variables. Descriptive statistics of research constructs are shown in Table 2[1].

Insert Table 1 about here

Insert Table 2 about here

DATA ANALYSIS

Measurement Model

The measurement model was evaluated prior to the structural model, in terms of reliability, unidimensionality, convergent validity, and discriminant validity. Confirmatory factor analysis (CFA) was performed by using AMOS 5.0 to assess construct validity. The initial model of the

[1] Data pooling was justified through a measurement invariance analysis. The results are that (1) the measurement models are invariant across firms and (2) there are no statistical differences in their structural models.

eight constructs comprised of the thirty-four items did not show acceptable model fit (see Table 3). The model was then refined iteratively by eliminating items, one at a time, which had low loading or shared high residual variance with other items (Gefen, Straub, & Boudreau, 2000). After dropping items, the final model with twenty-eight items showed significant improvement (Table 3).[2] Except for the Goodness of Fit Index (GFI), which was close to the criterion of 0.90, all indices, particularly the important robust indices of Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), were above their criterion levels.[3] These indices jointly suggest acceptable measurement model fit.

Insert Table 3 about here

After dropping items, the Cronbach's alpha and composite reliabilities (see Table 4) were all greater than 0.70 (Nunnally, 1994), supporting reliability. In addition, the average variance extracted (AVE) for each construct was all higher than 0.50 (Fornel & Larcker, 1981). This suggests that construct items explain more variance than the error terms. Unidimensionality was also supported with AVE higher than 0.50 and composite reliabilities higher than 0.70 (Segars, 1997). Next, discriminant validity is supported if the value of AVE of a construct is higher than its squared correlations with other constructs (Fornel & Larcker, 1981). The results in Table 5 suggest good discriminant validity.

Insert Table 4 about here

Insert Table 5 about here

Structural Model

[2] This model were achieved by eliminating one item in Perceived Innovativeness with IT, two items in Social Influence, one item in Computer Self-efficacy, one item in Management Support, and one item in Perceived Usefulness with low loading or high cross loadings. It was noted that every item dropped was carefully read to verify that its residual variance also made sense from a theoretical perspective

[3] GFI can be brought to 0.90 by dropping additional items. However, in order to keep content validity, we decided to stop dropping items at this stage (Gefen et al., 2003). It is common that Structural Equation Modeling (SEM) models seldom have excellent fit values in all the indices (Boudreau, Gefen, & Straub, 2001).

Following the establishment of the measurement model, we proceeded to examine the structural model. The ratio of χ^2 to the degree of freedom is 2.32, which is within the acceptable limit (Byrne, 1989). Except for GFI (0.88), which is slightly lower than the commonly cited threshold, all other fit indexes are within accepted thresholds: CFI at 0.93, TLI at 0.92, AGFI at 0.85, SRMR at 0.044, and RMSEA at 0.059. These results collectively suggest a good fit between the structural model and data.

Insert Figure 3 about here

Figure 3 illustrates the path coefficients and explained variance for the resulting model. This model successfully explained 67.9 percent of the variance in emergent use. Emergent use was predicted by perceived usefulness (β=0.48), personal innovativeness with IT (β=0.37), and user satisfaction (β=0.17). In addition to its direct effect, perceived usefulness also indirectly influence emergent use (β=0.05)[4] via user satisfaction. Personal innovativeness with IT, too, had an indirect effect on emergent use (β=0.07) via perceived usefulness. Meanwhile, perceived usefulness was informed by confirmation of expectation (β=0.30) and personal innovativeness with IT (β=0.14). Confirmation of expectation and personal innovativeness with IT jointly accounted for 68.8% the variance in perceived usefulness. Satisfaction was affected by confirmation of expectation (β=0.50) and perceived usefulness (β=0.31), which collectively explained 55.6% of the variance in satisfaction. Confirmation of expectation also indirectly influence satisfaction (β=0.09) via perceived usefulness. As a result, seven of the twelve hypotheses were supported.

RESULTS AND DISCUSSION

[4] If an antecedent (e.g., Perceive Usefulness) influenced Emergent Use through a mediating factor (Satisfaction), its overall impact on Emergent Use was calculated as the cross-product of its impact on the mediator ($\beta_{(\text{Perceived Usefulness} \rightarrow \text{Satisfaction})}$) and the impact of the mediator on Emergent Use ($\beta_{(\text{Satisfaction} \rightarrow \text{Emergent Use})}$).

This study examined the emergent use of complex information systems by employee users in organizational contexts. The results revealed that users' emergent use of information systems in organizations is determined by their risk-taking propensity in IT (i.e., personal innovativeness with IT) and the two important determinants in post-acceptance stage (i.e., perceived usefulness and satisfaction) suggested by IS continuance model (Bhattacherjee, 2001). Also, the operationalized items of the emergent use construct demonstrated much higher reliabilities compared with results in prior studies.

Among the aforementioned factors, perceived usefulness was the most powerful determinant for emergent use at the post-adoption stage. Meanwhile, different from extant research, this study focuses on emergent use in the mandatory context. Prior research in voluntary settings has shown that perceived usefulness is a stronger predictor of behavioral intention than attitude affect at the acceptance stage; whereas satisfaction affect is a more powerful determinant of continuance intention than perceived usefulness at the post-acceptance stage (Bhattacherjee, 2001). Findings across these studies suggest that perceived usefulness consistently influences IS innovative behaviors; yet its strength in relation to other affective determinants may fluctuate across temporal stages and contexts.

Moreover, the strong relationship between perceived usefulness and emergent use implies the critical role of users' tendency of taking a tool-oriented view of information technologies. Users are more likely to creatively use an IS when they think the system can provide considerable or desirable utilities. Perceived usefulness, in turn, was influenced by both users' confirmation of expectation from IS use and their personal innovativeness with IT. The importance of confirmed expectation to perceived usefulness suggests that user perception of IS instrumentality may be adjusted by their extent of confirmation (Bhattacherjee, 2001).

In addition to perceived usefulness, satisfaction and personal innovativeness with IT also showed significant effects on emergent use. Emergent use, as a post-acceptance behavior, is subject to the influence of experience-based factors, such as satisfaction. Reflecting post-acceptance affect, satisfaction is the aggregate affective state resulting from users' direct experiences in prior stages. It is, therefore, more realistic, unbiased, and less susceptible to change (Bhattacherjee, 2001). That is to say, satisfaction channels the impact of users' initial experiences into emergent use. Thus, acceptance in the initial usage stage can be linked to post-acceptance emergent use via satisfaction.

Satisfaction can be explained by confirmation of expectation and perceived usefulness. Similar to the effect that perceived usefulness influences attitude affect during acceptance stage (e.g., Davis et al., 1989), perceived usefulness also has bearing on satisfaction affect post-acceptance. Perceived usefulness at the post-acceptance stage is based on users' experiences at the acceptance stage. The higher beliefs they develop about the usefulness, the more likely they will be satisfied with the IS. Furthermore, satisfaction can be directly enhanced if users' initial usage confirms their earlier expectation about the system (i.e. confirmation of expectation). In line with prior research, confirmation of expectation also influences satisfaction indirectly via perceived usefulness (Bhattacherjee, 2001).

Among the individual characteristics, as expected, personal innovativeness with IT exhibited a strong effect on perceived usefulness and emergent use, whereas computer self-efficacy had an insignificant effect. Implementing complex innovations, such as ERP systems, is a risk-taking behavior (Gattiker & Goodhue, 2005). Our results strongly support that users' risk-propensity in general and willingness to explore new aspects of IT in specific have very positive influences on using information systems innovatively. Individuals with higher perceived

innovativeness with IT can appreciate complex IS more positively as well as engage in new ways of using these systems more actively.

Contrary to our expectation, the relationship between computer self-efficacy and perceived usefulness was not supported. It appears that perceived instrumental outcomes are not influenced by individual confidence in their ability to engage in IS use. Conversely, Compeau and Higgins (1995b) found the positive relationship between computer self-efficacy and perceived usefulness at the acceptance stage. A speculative explanation is that the influence of computer self-efficacy on perceived usefulness may attenuate as users gain more direct experience. Prior to post-acceptance, the outcome expectation of novice users is very sensitive to the perception of their own ability. As users accumulate additional knowledge and experience about the IS, the importance of their self-efficacy beliefs on perceived usefulness may thereby decrease at the post-acceptance stage.

Also unexpectedly, computer self-efficacy had no direct effect on emergent use. Recent research has shown that computer self-efficacy has a significant effect on perceived ease of use (e.g., Lewis et al., 2003); and that perceived ease of use fully mediates the impact of computer self-efficacy on behavioral intention (e.g., Venkatesh & Morris, 2000). Empirical studies, which compared cross-stage effects, also found the influence of perceived ease of use insignificant post-acceptance (Davis et al., 1989; Karahanna et al., 1999; Parthasarathy & Bhattacherjee, 1998). As a result, the behavioral impact of computer self-efficacy appears to be limited at the post-acceptance stage based on the results of this research. Furthermore, intention-behavior association holds in voluntary settings but may not in mandatory ones (Nah et al., 2004; Rawstorne et al., 1998). Even if computer self-efficacy has an effect on perceived ease of use, this relationship may not be transferred to the usage behavior via intention. Both rationales may,

to a certain degree, explain this lack of a statistically significant effect.

Social influence appeared to bear little influence on perceived usefulness. In theory, social influence can impact individual behavior through three mechanisms: compliance, internalization, and identification (Warshaw, 1980). Individuals may alter their behavioral intention in order to *comply* with social pressure. Social compliance may not have a significant effect in voluntary contexts; however, it becomes significant in mandatory contexts (Venkatesh et al., 2003). In mandatory settings, social compliance is more important during the early stages, "with its role eroding over time and eventually becoming non-significant with sustained usage" (Venkatesh et al., 2003: 452). In addition to the effect on usage behavior, social influence has an important relationship with perceived usefulness, possibly via the psychological pathways of internalization and identification (Venkatesh & Davis, 2000). Individuals integrate the views of important referents as part of their own beliefs via internalization; while individuals attempt to accept and behave in a similar manner to those who possess referent power via identification (Lewis et al., 2003). However, we have not found this effect in this study. This may be attributed to the diminishing effect of social influence on perceived usefulness at the post-acceptance stage (Venkatesh & Morris, 2000). At the early stage, when individuals' opinions about the IS are relatively ill-informed, their beliefs about usefulness are affected by others' opinions (Venkatesh et al., 2003). However, after they accumulated more knowledge about the IS, others' opinions are of less importance.

Contrary to what we hypothesized, management support exerted no influence on either perceived usefulness or emergent use. This insignificant relationship between management support and perceived usefulness seems to differ from results in prior studies that focused on the acceptance stage. Such a discrepancy may be partially attributed to the work environment and

post-acceptance stage in the context of our study. Our sample was collected from organizations where usage was mandatory and post-acceptance users who had more than one year experience in using the ERP system. These users' perceptions and motivations of emergent use derived internally from their experience and their innovative propensity in IT dimension, but not from the external push, such as the encouragement and support from the management. Although management support has been suggested as a critical success factor for EPR implementation (e.g., Somers & Nelson, 2001), its impact on usage behavior that is explorative and innovative in nature may be limited.

LIMITATIONS

Like most empirical research, certain limitations inherent in the study must be acknowledged. First, our sample is limited to end users with mandated usage in organizations using a particular type of information systems. Conclusions drawn in this study are based on a single technology (e.g., ERP system) and a specific user group (i.e., employee users in large manufacturing organizations). Therefore, caution needs to be exercised when generalizing these research results to other technologies or environments. Future research may replicate this study to examine the robustness of the findings across a wide range of information systems and samples in other organizational contexts.

Next, measures of all constructs in this study were gathered at the same point of time, rather than with a longitudinal study. However, these constructs investigated are not static. Because the research design was cross-sectional, this study may not fully capture the complexity of the emergent use phenomenon, thereby limiting the extent to which causality can be inferred. To infer causality more precisely, additional longitudinal research is necessary in the future. In addition, our findings provide no empirical support for the relationships from computer self-efficacy to perceived usefulness and to emergent use. Computer self-efficacy in this study was

assessed at a general rather than a task-specific level. This may have weakened the relationships between computer self-efficacy, perceived usefulness and emergent use. Future research is thus encouraged to use task-related self-efficacy to replicate this study in order to explore these relationships in a more detailed manner.

IMPLICATIONS

Information systems have been becoming a core component of modern organizations. However, existing evidence shows that the functional potential of these installed IS applications is underutilized. For example, users may adopt only a limited number of available features, use these features at low levels, and seldom apply task-related features to relevant operations (Davenport, 1998; Ross & Weill, 2002). System underutilization may be one of the major reasons for the under-achievement of information systems initiatives (Jasperson et al., 2005). The concepts of emergent use warrants a promising avenue for studying IS post-acceptance behavior that can bring significant impact to organizations. Therefore, both managers and researchers need to better understand what drives individuals to explore new ways to use the system in organizational settings if returns are to be maximized.

Implications for Research

From the perspective of theory advancement, this paper represents a critical contribution to the fields of IS acceptance and implementation, as it is one of the first studies that focus specifically on emergent use. Emergent use is defined as the extent to which an individual uses a technology in an innovative manner to support his/her work tasks. Unlike such related concepts as post-adoption behavior (Jasperson et al., 2005), continuance (Bhattacherjee, 2001), and routinization and infusion (Saga & Zmud, 1994), emergent use in this study emphasizes the close link between one's usage behavior and performance.

Drawing upon multiple research streams, including IS continuance, cognitive psychology,

and IS implementation research, this paper proposes a model to understand emergent use of complex information systems in mandatory organizational settings. The final model explained 67.9% of the variance in emergent use, suggesting that this model serves as an adequate conceptualization of the phenomenon of interest. The results also offered insights into key determinants of emergent use, including perceived usefulness, personal innovativeness with IT, and user satisfaction.

Perceived usefulness is the most important predictor of emergent use in this study. By combining the socio-psychology and technology acceptance theories, Karahanna and Straub (1999) furthered our understanding of the ways in which social contexts inform the perception of usefulness. Lewis et al. (2003) suggested that influences emanating from the individual, institutional, and social contexts, as a whole, shape individuals' beliefs about their IS use. Even with all the insights, these studies focused on initial usage at the acceptance stage, rather than emergent use at the post-acceptance stage. Note that perceived usefulness can be dynamic rather than static across the adoption, acceptance, and post-acceptance stages. Prior research provides preliminary empirical evidence that user beliefs do change over time (Szajna & Scamell, 1993; Venkatesh & Davis, 2000). Bhattacherjee and Premkumar (2004) also elaborated how users' beliefs change during the course of their IS usage. In this vein, this study is an important step toward better understanding the formation of perceived usefulness at the post-acceptance stage. And given the importance of perceived usefulness for IS usage, more studies should examine the antecedents and moderators of perceived usefulness at the post-acceptance stage.

In line with the IS continuance model (Bhattacherjee, 2001), user satisfaction was predicted by confirmation of expectation and perceived usefulness. Derived from the expectation-confirmation theory, these two determinants jointly explained 55.6% of the variance in

satisfaction, a much higher percentage than the 33% in the previous study. However, satisfaction in this study was operationalized as *overall* satisfaction. Some researchers have decomposed user satisfaction into a collection of beliefs, such as satisfaction toward systems, information, or services (Wixom & Todd, 2005). Understanding the differential impact between distinct types of satisfaction on emergent use will certainly advance our knowledge of the phenomenon of interest.

Personal innovativeness with IT represents the degree to which an individual is willing to try out any new IT (Agarwal & Prasad, 1998). The inclusion of personal innovativeness with IT helped us better understand post-acceptance behavior by delineating the important role of individual traits in IS emergent use. The identification of the significant behavioral impact of personal innovativeness with IT on innovative post-acceptance behavior (i.e. emergent use) is, however, not totally a surprise. Given that emergent use concerns explorative and novel ways of using IS, innovative users are understandably more inclined to demonstrate this type of behavior. The revealed relationship, to a certain extent, endorses Agarwal and Prasad's prediction of the salient influence of personal innovativeness with IT on innovative IT behaviors. Toward this end, we believe that personal innovativeness with IT deserves further attention, especially when IS research has increasingly emphasized the importance of post-acceptance behavior where individual aptitude makes differences. Personal innovativeness with IT should also be controlled in future emergent use research.

Although employees are mandated to use the installed system, after obtaining more experience, they may find new ways to appropriate the system further than the functionalities originally specified by the designers or implementers, thereby engaging in the state of emergent use (Cooper & Zmud, 1990; Jasperson et al., 2005). Even if an organization enforces IS usage, users still possess considerable control on whether they intend to explore new features to support

their tasks (Jasperson et al., 2005). In other words, emergent use might be conceptually voluntary. Hence, to stimulate emergent use post-acceptance, researchers may turn to factors associated with voluntary behavior. For instance, Malhotra and Galletta (2005) offered empirical insights about system users' commitment and how it affects volitional usage. Karahanna (1999) also proposed the concept of symbolic adoption for post-acceptance behavior. Symbolic adoption refers to the degree of voluntary mental acceptance of the idea component of an IT innovation. Both notions shed light into the emergent use issue and should be employed in future research toward this direction.

A post-hoc close examination of the concept and operationalization of the management support construct revealed an interesting observation. In most IS studies, the concept of management support refers to such activities as providing financial, personnel, educational, and technical resources. These resources are instrumental for system implementation and individual usage. However, none of the above resources directly encourage and/or stimulate exploratory and innovative behavior such as emergent use. This *typical* management support is conceptually limited and only suitable for regular acceptance behavior. Creative usage behavior at the post-acceptance stage potentially requires a whole new set of support that is distinct from earlier stages. We therefore strongly urge the new conceptualization of management support that aims purposely toward facilitating emergent use. This direction, we believe, represents a promising avenue for future theoretical development. Knowledge learned from efforts toward this end can greatly benefit research as well as practice.

Implications for Practice

From the perspective of practice, the strong association between perceived usefulness and emergent use suggests that employee users in an organizational context appear to be fairly pragmatic. Their motivations to use an information system, to a large extent, rely on practical

utility. Thus, employee users are more likely to explore how to use IS when the system provides considerable or desirable utilities. The indirect effect of perceived usefulness on emergent use via satisfaction suggests the value of satisfaction management through articulation of positive utilitarian outcomes. Hence, managers should consider communication strategies that foster favorable satisfaction affect at the post-acceptance stage.

Equally important is that users' satisfaction affect is also influenced by their experiences of IS use. Their direct experiences at earlier stages can either intensify or weaken their subsequent behavior (Hartwick & Barki, 1994; Kay & Thomas, 1995). In this vein, the idea of "Experience Economy" conceived by Pine and Gilmore (1999) offers a valuable perspective. They argued that modern business excellence rests upon an organization's capability to create favorable experiences. It is the process experienced by individuals that generates the most value. Therefore, fostering positive experiences of IS use is critical to emergent use. Managers should pay careful attention to the factors that drive positive experiences, and recognize that these factors may differ across different innovation stages.

System usage can be conceptualized as the interaction of three elements: the user, the information system, and the task (Goodhue, 1995). Structuration theory (Orlikowski, 2000) and fit-appropriation theory (Dennis, Wixom, & Vandenberg, 2001) both stress the ongoing interaction among these elements. Firstly, information systems can be simple or complex. Complex systems have a variety of features and functions. Some features represent the core of the technologies, while others are not defining components and their use may be optional (DeSanctis & Poole, 1994; Griffith, 1999). Features of a technology need to be interpreted and perhaps adapted by users to constitute a technology-in-use (Jasperson et al., 2005). The set of technology features used by an individual can change over time. Compared to the early-adopted

features, later-adopted features are typically more complex and powerful (Kay & Thomas, 1995). Furthermore, task outcomes are usually determined by the specific set of features used at a particular point of time (DeSanctis & Poole, 1994; Goodhue & Thompson, 1995). The more freedom users have to adjust both software features and organizational processes, the greater benefits they can realize (Lassila & Brancheau, 1999). It should be noted that a simple increase in the number of features used may not necessarily lead to an increase in performance outcomes. Positive outcomes are most likely to occur when individuals intelligently apply the technology features that fit their tasks (Jasperson et al., 2005).

Secondly, tasks are broadly defined as the actions carried out by individuals in turning inputs into outputs. Task-technology fit theory (Goodhue & Thompson, 1995) suggests that by interacting more with a system's deep structure, users are better positioned to complete each individual task, thereby increasing performance. However, the kinds of tasks vary across hierarchical levels in organizations. These tasks include activities such as executing routine transactions by clerical staff, changing business processes by mid-level managers, and making strategic decisions by higher-level executives. Then, what is the role of tasks in emergent use? This inquiry needs to be answered in future research.

Thirdly, Rogers (2003) recognized the existence of the re-invention phenomenon. He refers to re-invention as the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation. Instead of simply using a technology, users are active participants in the implementation process. Complex technology innovations, such as ERP systems with many potential applications, are more likely to be re-invented (Rogers, 2003). In such circumstances, re-invention may be a simplification strategy. This kind of simplification is more likely to occur in the initial usage stage when a user lacks the requisite knowledge to deal

with the complexity embedded in a technology. As the user learns more about the technology, more features can be used at the post-acceptance stage. Given their high propensity to explore new functions, innovative users should thereby be positioned to play an active role in this learning process. In addition, users with higher personal innovativeness with IT can serve as crucial change agents since they are more inclined to develop and demonstrate positive beliefs about IS use as well as actually use IS innovatively (Lewis et al., 2003). Innovative users are a valuable resource to cope with potential problems in the implementation of complex information systems. However, unlike beliefs and affects, personal innovativeness with IT is a rather stable individual characteristic that is less likely to vary across circumstances (Agarwal & Prasad, 1998). In other words, personal innovativeness with IT will not be easily influenced by environmental or internal variables. It may be therefore difficult to change users' personal innovativeness with IT through organizational interventions. Instead of trying to manipulate personal innovativeness with IT, managers may as well focus on identifying individuals who are innovative toward IT innovations through recruitment and selection.

CONCLUSIONS

In conclusion, emergent use is an emerging and critical issue for firms implementing complex information systems. Understanding emergent use permits insights into innovative IS behaviors that lead to significant organizational consequences. Emergent use also provides important explanations for the under-achievement or failure of many complex information system initiatives. Drawing upon insights from the individual IS continuance model and organizational assimilation framework, a model was proposed to approach this phenomenon. The model was empirically examined in two large manufacturing firms that have implemented ERP systems with mandatory usage for more than one year. The results suggest that IS emergent use is influenced by perceived usefulness, satisfaction with IS use, and personal innovativeness with

IT. A good understanding of the employees' emergent use provides an immediate linkage to specific factors that managers and employees can lever to improve performance. The concept of emergent use warrants a promising avenue for studying IS post-acceptance behavior. The current research represents an important first step toward tackling the emergent use issue in organizational contexts. We hope this study will stimulate others to extend this line of research further.

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TABLE 1
Sample Demographics

ERP Employee Users	Category	Percentage
education	Primary School	1.3%
	Junior High School	2.2%
	Senior High School	16.9%
	College	36.1%
	Bachelor	34.7%
	Master	6.6%
	Doctorate or above	2.2%
Age	18-22 years old	14.3%
	23-29 years old	31.5%
	30-39 years old	35.1%
	40-49 years old	14.6%
	50 years old or above	4.5%
Gender	Male	41.8%
	Female	58.2%
Working department	Finance	10.7%
	Marketing	27.2%
	Production	27.2%
	Human Resource Management	11.5%
	Others	23.4%

TABLTE 2
Descriptive Statistics

Construct	Mean	S. D.
Confirmation of Expectation	4.76	1.22
Social Influence	4.43	1.18
Computer Self-efficacy	6.46	2.02
Personal Innovativeness with IT	4.40	1.27
Management Support	5.09	1.17
Perceived Usefulness	4.84	1.25
Satisfaction	4.57	1.21
Emergent Use	4.28	1.29

Notes: All constructs except Computer Self-efficacy are seven-point scales with the anchors 1=strongly disagree, 4=Neutral, 7=Strongly agree. Computer Self-efficacy is a 11-point scale with anchors 0=Not at all confident, 10=Very Confident.

TABLE 3
Goodness of Fit for the Measurement Model

Goodness of Fit Indices	Initial Model	Revised Model	Desired Levels
χ^2 /df	2.47	2.34	< 3.0
GFI	0.84	0.88	> 0.90
AGFI	0.81	0.85	> 0.80
CFI	0.89	0.93	> 0.90
TLI	0.88	0.91	> 0.90
RMSEA	0.062	0.059	0.05-0.08
Standardized RMR	0.053	0.043	< 0.05
Number of Latent Variables	8	8	
Total Number of Items	34	28	

TABLE 4
Assessment of Internal Consistency and Convergent Validity

Dimensions	Number of Items	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Confirmation of Expectation	3	0.77	0.87	0.68
Social Influence	2	0.71	0.73	0.59
Computer Self-Efficacy	5	0.90	0.92	0.71
Personal Innovativeness with IT	3	0.73	0.84	0.63
Management Support	5	0.85	0.89	0.61
Perceived Usefulness	3	0.83	0.89	0.74
Satisfaction	4	0.87	0.91	0.71
Emergent Use	3	0.82	0.90	0.75

TABLE 5
Comparison of AVE and Squared Correlations

Var.	COE	SI	CSE	PIIT	MS	PU	SAT	EU
COE	**0.68**							
SI	0.05	**0.59**						
CSE	0.15	0.03	**0.71**					
PIIT	0.11	0.05	0.34	**0.63**				
MS	0.27	0.10	0.35	0.26	**0.61**			
PU	0.31	0.07	0.26	0.23	0.41	**0.74**		
SAT	0.37	0.07	0.11	0.12	0.20	0.33	**0.71**	
EU	0.25	0.04	0.27	0.27	0.26	0.40	0.25	**0.75**

1. COE=Confirmation of Expectation; SI=Social Influence; CSE=Computer Self-efficacy; PIIT=Personal innovativeness with IT; MS=Management Support; PU=Perceived Usefulness; SAT=Satisfaction; EU=Emergent Use
2. Diagonals represent the average variance extracted.
3. Off diagonal elements are the square of correlations among constructs.
4. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

FIGURE 1
The Post-Acceptance Model of IS Continuance (Bhattacherjee, 2001)

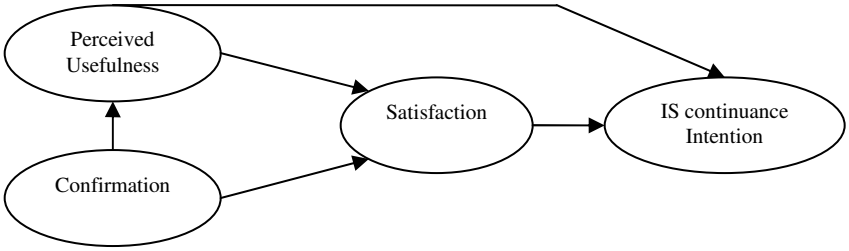

FIGURE 2
IS Emergent Use Research Model from Employees' Perspective

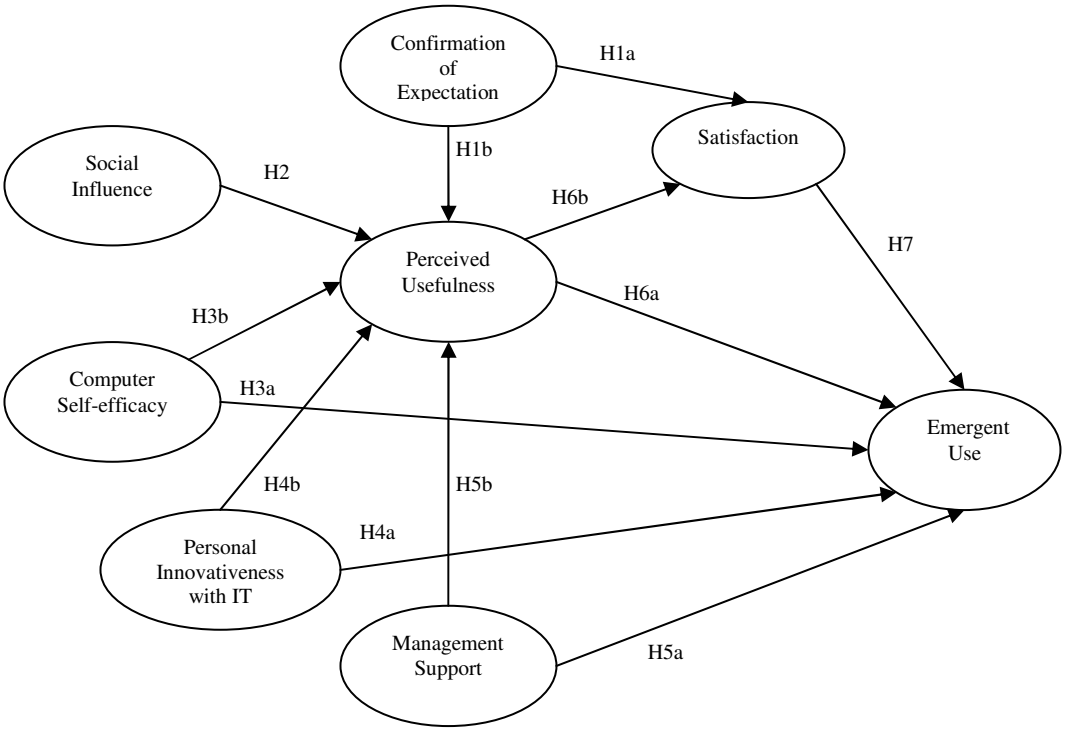

FIGURE 3
Results of the Model Test