Research Report

User experience and personal innovativeness: An empirical study on the Enterprise Resource Planning systems

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ABSTRACT

Although user experience and personal innovativeness are two important factors in new technology adoption, there has been no prior study to test these factors with the Enterprise Resource Planning (ERP) adoption. This paper investigates moderating roles of user experience on the relationship between the personal innovativeness and the ERP adoption motivations. This issue is important because if the user has more experience with the systems then the power of influence of personal innovativeness on ERP adoption motivation would be different. Thus, this paper tests these important insights of ERP systems adoption with the two different field samples with high (more than three years) and low (less than three years) user experience, based on the innovation diffusion theory, self determination theory, and different types of motivations such as intrinsic and extrinsic motivations. The findings, based on the PLS analysis of the model using 107 ERP end users, show that there are clear moderating effects of user experience—such as impacts of personal innovativeness on ERP systems adoption motivations are higher in case of low user experience samples, as expected. Academic and practical implications are discussed in the paper based on these empirical findings.

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1. Introduction

Enterprise Resource Planning (ERP) systems are gaining interest from both practitioners and researchers because these systems are essential to organizational and individual user's productivity (Grant, Hwang, & Tu, 2013; Hwang, 2012a; Hwang & Grant, 2011). ERP systems are usually large systems involving different types of stakeholders as end users in the organization (Akkermans & van Helden, 2002; Burns, Jung, & Hoffman, 2009). The importance of ERP systems adoption by the end users is consistently emphasized for the successful implementation of enterprise systems (Davison, 2002). Furthermore, given the implementation environment of ERP systems involves different technical environment such as Europe (Hanseth, Ciborra, & Braa, 2001) and Asia (Liang, Xue, Boulton, & Byrd, 2004; Martinsons, 2004), the complexity inherent in the adoption of ERP systems becomes an important issue in that users will have different motivations with different technical backgrounds and experiences. Researchers also investigate ERP systems management and implementation issues which compares different end users based on different user characteristics. For example, many studies have looked into IT adoption (including ERP adoption) in various technical backgrounds and individual characteristics (e.g., Martinsons, 2004; Saeed, Hwang, & Yi, 2003). These issues are important because currently ERP systems involve end users with different individual backgrounds.

Self determination theory (Deci & Ryan, 1985; Korpelainen, Vartiainen, & Kira, 2010) showed that all individuals have natural, innate, and constructive tendencies to develop an ever more elaborate and unified sense of self. It focuses on how individuals develop a coherent sense of self through regulation of their behavioral actions that may be self-determined, controlled, or motivated. Self determination theory emphasizes an individual's intrinsic motivation (perceived enjoyment) as a main behavioral mechanism in general social behavior.

Rogers' (1983) innovation diffusion theory shows that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Moore and Benbasat (1991) extended the set of perceptions proposed by Rogers (1983) to include seven perceived characteristics of an innovation as predictors of IT adoption behavior. Agarwal and Prasad (1998) also provided Personal Innovativeness in IT (PIIT), the willingness of an individual to try out any new information technology, as a trait and a relatively stable predictor of individuals

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that is invariant across situational considerations. Lewis, Agarwal, and Sambamurthy (2003) also showed that PIIT has effects on intrinsic and extrinsic motivations about new IT such as perceived ease of use (PEOU), perceived usefulness (PU).

Specifically, this paper investigates the influence of PIIT on intrinsic and extrinsic motivations of ERP systems adoption with the different user experience groups (more than three years and less than three years of ERP user experiences). Liang et al. (2004) also argued, based on various ERP systems implementation cases, that ERP systems strategies must consider different user experiences, backgrounds, and localized strategies. Thus, the specific research question in this study is as follows: ‘‘Is there any difference of the impacts of PIIT on ERP systems adoption motivations, such as intrinsic and extrinsic motivations, in the different user experience groups?’’

We have the following research objectives in this study. First, we investigate moderating roles of user experience on the relationship between the personal innovativeness and the technology adoption motivations. Given that personal innovativeness is very important construct for technology adoption, further understanding this construct would provide academic contribution to IS community. Second, we integrate the self determination theory and the innovation diffusion theory in view of individual-level of analysis of the end users’ ERP adoption. We test these models based on the field survey data of ERP system users. ERP systems are one of the most important and complex systems for the current business organizations, and understanding the complex phenomena on ERP system users would also provide practical contribution.

2. Research model and hypotheses

Agarwal and Prasad (1998) also provided Personal Innovativeness in IT (PIIT), the willingness of an individual to try out any new information technology, as a trait and a relatively stable predictor of individuals that is invariant across situational considerations. They provided valid measures of PIIT and showed that PIIT has a moderating effect between perceptions about new IT (relative advantage, PEOU and compatibility) and intention to use new IT. While innovativeness has received attention as a determinant of innovation adoption behavior, marketing research noted that it is important to conceptually and operationally draw a distinction between global innovativeness and domain-specific innovativeness (Agarwal & Prasad, 1998; Flynn & Goldsmith, 1993). Lewis et al. (2003) explained that domain-specific PIIT is an important source of ‘‘individual influence’’ on IT adoption, which is different from ‘‘social influences.’’

Based on the self determination theory (Deci & Ryan, 1985), Malhotra and Galleta (2005) argued that tacit perspective of knowledge management such as ERP implementation should be managed and controlled mainly by self control or intrinsic motivation, rather than by formal controls based on self determination theory. The role of intrinsic motivation, such as perceived enjoyment, for the adoption of enterprise systems is recently gaining significant interest from IS researchers based on the self determination theory. Malhotra and Galleta (2005) recently argued that a system user’s intrinsic motivational development was omitted in the previous research model, such as the technology acceptance model, which investigated IS adoption. A better understanding of the nature of systems users’ intrinsic motivational factors promises to contribute to the design of more effective enterprise systems and the company’s more successful organizational IS implementation and management. In ERP systems implementation, project managers can use intrinsic motivation or the values of end users to contribute to systems adoption. An intrinsic dimension of IS use is related to self control in the organizational setting and tacit knowledge perspective (Malhotra & Galleta, 2005). Sia, Tang, Soh, and Boh (2002) explained enterprise systems implementation with the empowerment concept, which is related to self control. They argued that enterprise implementation gives users more job discretion than their functional needs, and there is a reduction in procedural formality within the modular design. This intrinsic dimension of self control in ERP systems implementation should be investigated further.

Based on the innovation diffusion theory and self determination theory, we propose the research model as depicted in Fig. 1. In this study we expect that PIIT influences intrinsic motivation (such as PEOU and perceived enjoyment) and extrinsic motivation (such as PU) in ERP systems adoption. Further, we included in the model the moderating effects of user experience (more than three years and less than three years of ERP user experiences).

Limayem, Khalifa, and Frini (2000) argued that using IS is an innovative behavior that is more likely to be adopted by innovators than non-innovators. Thus, it is important to include this construct in order to account for individual differences. Limayem et al. (2000) included personal innovativeness and social norms in the model of online consumer behavior, and found positive relationships with purchase intention (p < .001). In their model, personal innovativeness is a global innovativeness construct based on
Rogers’ (1983) innovation diffusion theory rather than a domain-specific innovativeness. Global innovativeness, such as personal innovativeness in Limayem et al.’s (2000) study, exhibits low predictive power when applied to any specific innovation adoption decision (Goldsmith & Hofacker, 1991; Leonard-Barton & Deschamps, 1988). Domain-specific innovativeness, such as PIIT (Agarwal & Prasad, 1998), is posited to exhibit a significant effect on behaviors within a narrow domain of activity (Goldsmith & Hofacker, 1991), and it has been suggested that this trait also can be measured directly via self-report, in a manner similar to the measurement of attitudes and other personality traits (Flynn & Goldsmith, 1993; Lee, Lee, & Hwang, 2014). Although personal innovativeness in IT is modeled as a moderator according to Agarwal and Prasad (1998), and Thatcher and Perrewe (2002) and Lewis et al. (2003) link it directly to intention to use ERP systems.

Regerreis, Engel, and Blackwell (1970) showed that innovative individuals tend to demonstrate higher self-confidence when performing new tasks. Thatcher and Perrewe (2002) also found a direct positive effect (p < 0.01) of PIIT on computer self-efficacy, which is an antecedent to perceived ease of use. A recent study by Lewis et al. (2003) supported the direct positive effects of PIIT, a source of individual influence in technology adoption, on intrinsic motivation. Lin and Hwang (2014) found that knowledge self-efficacy, personal perception on the ability to create knowledge using IT, has direct influence on affective commitment. To investigate the relationship between an individual’s influence on innovation and technology adoption, the current study relates PIIT to intrinsic motivation.

H1. PIIT will have a positive effect on perceived enjoyment.

Agarwal and Prasad (1998) also showed that PIIT has a moderating effect between perceptions of new IT (relative advantage, PEOU and compatibility) and intention to use new IT. A recent study by Lewis et al. (2003) supported the direct positive effect of PIIT on perceived ease of use (PEOU) based on the technology acceptance model (Davis, 1989). PEOU is an intrinsic motivation (Davis, Baggozzi, & Warshaw, 1992; Hackbarth, Grover, & Yi, 2003; Hwang, 2012b; Van der Heijden, 2004; Venkatesh, 2000) while PU is an extrinsic motivation (Davis, 1989). If a person is more innovative to new IT, he or she will try out the new system with less perceived effort (intrinsic motivation). Thus, this study hypothesizes that:

H2. PIIT will have a positive effect on perceived ease of use.

Lewis et al. (2003) supported the direct positive effect of PIIT on perceived usefulness (PU) based on the technology acceptance model (Davis, 1989). Yi, Fiedler, and Park (2006) also recently found that there are direct and strong influence of PIIT on PU in their empirical test with the large samples of healthcare employees in adopting Internet and mobile technologies. Kim and Hwang (2012) also emphasized that intrinsic and extrinsic motivations are important factors of systems adoption based on their test with mobile commerce user groups. If a person is more innovative to new IT, he or she will try out the new system with more perceived benefit (extrinsic motivation). Thus, this study hypothesized that:

H3. PIIT will have a positive effect on perceived usefulness.

We expect that there would be moderating effects of user experience in the relationships among PIIT, intrinsic motivation, and extrinsic motivation to use ERP systems, based on recent findings in end user computing in different user group environments (Anderson, Al-Gahtani, & Hubona, 2011; Hwang, 2012a; Hwang & Lee, 2012; Iivari, 2010; Kim & Hwang, 2012; Saeed et al., 2003).

Specifically, we expect that the influences of PIIT on motivation to use ERP systems are higher in the low user experience group, since the influences of PIIT on motivations would be more important when the end users have less experience with the systems. On the other hand, we expect that the influence of PIIT in the high user experience group (i.e., more than three years of user experience of ERP systems) would not be as strong since they already experienced the systems and there are many other factors for the usage motivation rather than PIIT based on these experiences. Thus, we hypothesize that:

H4-1. PIIT will have a stronger effect on enjoyment in the low user experience group.

H4-2. PIIT will have a stronger effect on PEOU in the low user experience group.

H4-3. PIIT will have a stronger effect on PU in the low user experience group.

3. Research design

3.1. Data collection

Actual ERP systems users in the ERP systems user group on the Internet are the target samples of this study. The ERP systems vendor in this study is one of the three largest IT solution providers in the world, with revenues of $45 billion and 157,000 employees worldwide. The vendor’s ERP systems are used by more than 1000 enterprise customers in manufacturing, automotive, capital equipment, telecommunication, and electronics industries. The ERP systems user group is the not-for-profit user community of these specific enterprise system users. Members are typically general end users in the customer organizations. The user group also hosts an annual Web conference to discuss enterprise systems issues among customers and users. The survey website was distributed on the discussion board of this website, and members voluntarily participated in the online survey based on their experience with the target ERP system.

One hundred and seven ERP systems end users voluntarily participated in the study – 57 of them have less than three years of user experience and the other 50 have more than three years of user experience with the systems. The average age was twenty-seven years, and seventy-three percent of participants were male. The participants have worked in their current company for 5.8 years on average. The majority of participants (85%) did not major in computer-related disciplines in school. Non-response bias was assessed by verifying that the respondents’ demographics are similar to those of current ERP systems users in the user group, and by verifying that the responses of early and late respondents were not significantly different (Armstrong & Overton, 1976).

All of the constructs in the research model were measured with the items adapted from prior research. All of the questionnaire items use an 11-point Likert-type scale, where 1 = completely disagree, 6 = neither agree nor disagree, and 11 = completely agree to increase the sensitivity of the measurement (Hwang, 2011) (see Appendix for the items used and loadings). This study uses three items of PIIT from Agarwal and Prasad (1998), and three items of perceived enjoyment and four items of PEOU and PU modified version for ERP systems from Davis et al. (1992) and Davis (1989). We directly asked to end users how many years have used the specific ERP systems. We divided the samples with less than three years of user experience group (n = 57) and more than three years of user experience group (n = 50).
3.2. Data analysis

Measure validation and model testing were conducted using Partial Least Square (PLS) Graph Version 3.0 (Chin & Frye, 1998), a structural equation-modeling (SEM) tool that utilizes a component-based approach to estimation. PLS makes few assumptions about measurement scales, sample size, and distributional assumptions (Chin, 1998; Falk & Miller, 1992; Fornell & Bookstein, 1982; Wold, 1982; Yi & Hwang, 2003). The model in this study has complex moderating relationships that can be tested by PLS manipulation (Keil, Tan, Wei, & Saarinen, 2000). Chin (1998, p. 311) advises that “if one were to use a regression heuristic of 10 cases per indicator,” the sample size requirement would be 10 times (1) the largest number of formative indicators or (2) the largest number of independent variables impacting a dependent variable, whichever is the greater. In our model, there is no formative indicator and the largest number of independent variables impacting a dependent variable is only one. Thus, our sample size of 107 (57 and 50) is more than adequate for the PLS estimation procedures.

Before testing the hypothesized structural model, we first evaluated the psychometric properties of the study variables through confirmatory factor analysis. The measurement model was assessed by using PLS to examine internal consistency reliability (ICR) and convergent and discriminant validity (Barclay, Higgins, & Thompson, 1995; Chin, 1998; Yi & Davis, 2003). Internal consistencies of 0.7 or higher are considered adequate (Barclay et al., 1995; Chin, 1998; Yi & Davis, 2003). To assess convergent and discriminant validity, the square root of the average variance extracted (AVE) by a construct should be at least 0.707 (i.e., AVE > 0.50) and should exceed that construct’s correlation with other constructs. Tables 1 and 2 show that the psychometric properties of the study variables were considered relevant and sufficiently strong to support valid testing of the proposed structural model in two sample groups. Tables 3 and 4 present the factor structure matrix of the study variables in two sample groups. The factor structure matrix showed that all items exhibited high loadings (>0.707) on their respective constructs, and no items loaded higher on constructs that they were not intended to measure, demonstrating strong convergent and discriminant validity. Collectively, the psychometric properties of the constructs were considered more than adequate.

3.3. Results

The PLS structural model and hypotheses were assessed by examining path coefficients and their significance levels. Following Chin (1998), bootstrapping (with 500 resamples) was performed on the model to obtain estimates of standard errors for testing the statistical significance of path coefficients using a t-test. Figs. 2 and 3 provides the results of hypothesis testing. All direct paths in the model were supported within the 0.001 significance level in the low experience group and 0.01 in the high experience group. R squares of the enjoyment, PEOU, and PU in the low experience group were 0.49, 0.46, and 0.44 (Fig 2). However, R squares of the enjoyment, PEOU, and PU in the high experience group were 0.27, 0.20, and 0.26 (Fig 3), which is significantly lower comparing to the low experience group.

To test the moderating effects of country, we adapted the procedure by Keil et al. (2000) and Hwang (2010). Based on Keil et al.’s (2000) suggestion, this paper shows the detailed comparison table of path coefficients in Table 5. Earlier studies that compared corresponding paths across structural models had simply looked at the numerical values of path coefficients without conducting a statistical test. Hypotheses 4-1, 4-2 and 4-3 were examined by comparing the path coefficients based on Chin as described by Keil et al. (2000). All the hypotheses were confirmed within the 0.001 significance level.

4. Discussion

The results of the study clearly point out the important role of user experience factors and their moderating influence on PU, intrinsic/extrinsic motivations of ERP systems’ end users. ERP systems are innovative systems that change the financial accounting environment substantially as the processes used to record, assimilate and distribute such information all radically change (Soutar & Ward, 2008; Sutton, 2006). Financial reports no longer need to be constructed by a set of accountants, but rather the processes used to record, assimilate and distribute such information all radically change. The innovative ERP systems assimilate and distribute such information all radically change (Soutar & Ward, 2008; Sutton, 2006). The innovative ERP systems assimilate and distribute such information all radically change (Soutar & Ward, 2008; Sutton, 2006). The innovative ERP systems assimilate and distribute such information all radically change (Soutar & Ward, 2008; Sutton, 2006).
Table 4
Factor structure matrix of high user experience group.

<table>
<thead>
<tr>
<th>Scale items</th>
<th>Enjoyment</th>
<th>PEOU</th>
<th>PIIT</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment1</td>
<td>0.92</td>
<td>0.61</td>
<td>0.50</td>
<td>0.41</td>
</tr>
<tr>
<td>Enjoyment2</td>
<td>0.89</td>
<td>0.28</td>
<td>0.47</td>
<td>0.73</td>
</tr>
<tr>
<td>Enjoyment3</td>
<td>0.97</td>
<td>0.39</td>
<td>0.47</td>
<td>0.55</td>
</tr>
<tr>
<td>PEOU1</td>
<td>0.37</td>
<td>0.84</td>
<td>0.41</td>
<td>0.48</td>
</tr>
<tr>
<td>PEOU2</td>
<td>0.45</td>
<td>0.90</td>
<td>0.21</td>
<td>0.18</td>
</tr>
<tr>
<td>PEOU3</td>
<td>0.43</td>
<td>0.95</td>
<td>0.53</td>
<td>0.32</td>
</tr>
<tr>
<td>PEOU4</td>
<td>0.43</td>
<td>0.87</td>
<td>0.29</td>
<td>0.05</td>
</tr>
<tr>
<td>PIIT1</td>
<td>0.54</td>
<td>0.45</td>
<td>0.93</td>
<td>0.52</td>
</tr>
<tr>
<td>PIIT2</td>
<td>0.45</td>
<td>0.21</td>
<td>0.73</td>
<td>0.26</td>
</tr>
<tr>
<td>PIIT3</td>
<td>0.24</td>
<td>0.46</td>
<td>0.88</td>
<td>0.40</td>
</tr>
<tr>
<td>PU1</td>
<td>0.77</td>
<td>0.33</td>
<td>0.51</td>
<td>0.86</td>
</tr>
<tr>
<td>PU2</td>
<td>0.62</td>
<td>0.26</td>
<td>0.35</td>
<td>0.89</td>
</tr>
<tr>
<td>PU3</td>
<td>0.28</td>
<td>0.36</td>
<td>0.50</td>
<td>0.83</td>
</tr>
<tr>
<td>PU4</td>
<td>0.36</td>
<td>0.04</td>
<td>0.27</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Fig. 2. PLS test results of low experience group (n = 57). Note. \(^*p < 0.01; \text{**}p < 0.001\).

Fig. 3. PLS test results of high experience group (n = 50).
4.1. Theoretical implications

There are two major contributions in this study as follows:

(1) This study clearly compares user experience moderation to understand complex information systems such as ERP. Although user experience has been emphasized in the empirical IS studies, the moderating effects of use experience on PIIT and a complex systems adoption, such as ERP, have not yet been tested. We think that it is time for looking at this important logic, since ERP has been implemented in the various sizes of organization and there are many different end user backgrounds for the implementation.

(2) This study integrates the self determination theory and the innovation diffusion theory in view of individual-level of analysis of the end users’ ERP adoption. Given that ERP should be adopted and implemented actively by the end users, individual users’ psychological attitude and behavior with different backgrounds and characteristics should be investigated further. The self determination theory, emphasizing individual adopter’s intrinsic motivation, as well as extrinsic motivation are good frameworks to understand this process, but there have been relatively few studies in this field.

One of the many interesting findings in the results was the high influence of PIIT on intrinsic motivations to use ERP systems. Specifically, this effect is stronger in the low user experience group. We can argue that future research can integrate user experience moderation and other constructs with these phenomena. Self-determination theory supports that end users’ intrinsic motivation is the most important factor for ERP adoption – however, the theory omitted the important user experience consideration. If the end user has enough experience with the systems, the perceived enjoyment could be not strongly related to the personal innovativeness in the systems – probably habitual usage or by supervisor’s commitment to ERP systems. In developing the belief in the intrinsic motivation of ERP adoption, an individual’s technical background and personal innovativeness play important role. Further study in this direction would be beneficial.

On the other hand, there is high influence of PIIT on extrinsic motivation, such as PU, to use ERP systems. This effect is also stronger in the low user experience group. In the low experience group, ERP systems are still considered as innovative systems and the end-user’s perception changes the strength of the relationship. In this sense, the study provides potential linkage between user experience factors of end users and organizational understandings of ERP implementation. Further, PIIT would be considered as a good adoption factor for ERP systems for the person with low user experience with the systems. Other systems, such as social network service, e-commerce, and mobile technologies, can be tested based on this framework with user experience moderation, linking still other dimensions, such as system quality, in future research. This study also suggests that user experience and personal innovativeness are not simple but more complex, with many different impacts on ERP implementation. An empirical test based on the theoretical grounds would be helpful to understand this specific implication.

4.2. Practical implications

To practitioners, this study shows how PIIT influences ERP system adoption motivations by the moderating effects of the user experience. For example, formal codification of management information inside an ERP system so that it can be accessed by many people should involve substantial consideration of user experience and personal innovativeness (Davison, 2002; Soh, Kien, & Tay-Yap, 2000). In implementing a multi-national project via Internet based ERP systems, managers can effectively use such technical variance to successfully implement it. They can establish teams, who are ERP users, with employees who seem to have different user experience and technical backgrounds (Tan, Smith, Keil, & Montealegre, 2003).

Another implication for practitioners is that intrinsic motivation and innovativeness of ERP systems can be applied to the “agile” methodologies (Fowler, 2003), which focus on “people” (as opposed to “process”) in developing IS. Agile methodologies focus on self-managed developers and users rather than on the mandated roles that people perform (Fowler, 2003). Thus, the agile methodologies promote a self-adaptive software development process and require responsible and motivated developers and users to develop enterprises whose business processes are designed to respond effectively to unanticipated change (Meade & Sarks, 1999). Traditional processes are compliance-driven and activities-and-measurement-based, aimed at providing assurance (Boehm, 2002; Boehm & Turner, 2004; Highsmith, 2002). Agile methodologies rely on speculation, or planning with the understanding that everything is uncertain, to guide the rapid development of flexible and adaptive systems of high value (Highsmith, 2002; Nerur, Mahapatra, & Mangalaraj, 2005). These systems stress the importance of assessing as opposed to measuring, and are highly tolerant of change. One of the biggest barriers to migration is the change in a process model from a life cycle model to one that supports feature based development using evolutionary and iterative development. Such a change entails major alterations to work procedures, tools and techniques, communication channels, problem-solving strategies, and roles of people.

The finding of this study that intrinsic motivation and innovativeness are important factors for ERP implementation shows that an agile methodology approach could be effectively applied to highly complex systems implementation such as ERP, since ERP implementation is influenced by the end user’s innovativeness.
and personal intrinsic motivation. Although there could be some drawbacks to the agile methodology when used for highly complex systems, such as cost and difficulty in coordination, we argue that team coordination and management to enhance intrinsic motivation and innovativeness considering different user experience would be sufficiently beneficial to overcome these drawbacks. Organizational training to promote intrinsic motivation or personal innovativeness (Coulson, Olfman, Ryan, & Shayo, 2010) is an important managerial tool in this environment—again considering different user experience and technical backgrounds of end users.

5. Limitations

There are several limitations to this research. First, the proposed model can be criticized because of the lack of detailed descriptions of the phenomena of the model. We did not convey anything regarding the specific nature of the work performed by the subjects using their respective ERP systems. Some ERP-related tasks (e.g., accounting) may be far more complex (foreign currency translations, prior-period adjustments) than others (entering sales information into the system); these individual measures and what they represent become far too opaque without a better understanding of the nature of the work performed by the subjects. Our study focuses on the user experience and personal innovativeness factors involved in ERP systems adoption based on the self-determination theory and innovation diffusion theory. Future research can test other detailed business processes and technology adoption.

Second, we did not include the other antecedents to PIIT or intrinsic/extrinsic motivations in the model. Future research can include other factors for them, such as CEO commitment or organizational constructs. These further antecedents would be helpful to completely understand different aspects in end-user adoption in the ERP systems context. Future research can also test the other models, such as unified theory of acceptance and use of technology (UTAUT) model (Venkatesh, Morris, Davis, & Davis, 2003), with the proposed model to complete our understanding.

6. Conclusion

This paper applies ERP systems adoption and implementation to the intrinsic/extrinsic motivations and PIIT with the consideration of user experience. The findings based on the PLS analysis of the model in the paper shows that there are clear user experience implications of these phenomena. The findings in this study clarify our research question. This study clearly shows the existence of user experience moderation on PIIT—which is the new contribution on the IS research. The direct effects of PIIT on intrinsic motivation (such as enjoyment and PEOU) and extrinsic motivation (PU) provides us the complete understanding of complex ERP systems based on the different user experience group samples in this study. Further, this study integrates the self determination theory and the innovation diffusion theory in view of individual-level of analysis of the end user's ERP systems adoption. The self determination theory emphasizing the individual adopter's intrinsic motivation was proved to be a good framework to understand this important research question. The path analysis for user experience moderation was tested rigorously based on the PLS based on Keil et al.'s (2000) and Hwang's (2010) methodology. This statistical analysis provided a more solid comparison of user experience moderating effects as we showed in the methodology section. This study would be beneficial to all endeavors for a successful ERP systems implementation project based on personal innovativeness, intrinsic/extrinsic motivations, and different user experience of the specific systems.

Appendix A

Instrument items and loadings

<table>
<thead>
<tr>
<th>Construct (source)</th>
<th>Items</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Innovativeness in IT</td>
<td>If I heard about a new IT, I would look for ways to gain experience with it Among my peers, I am usually the first to try out new IT</td>
<td>0.93</td>
</tr>
<tr>
<td>(Agarwal &amp; Prasad, 1998)</td>
<td>I like to experiment with new information technology</td>
<td>0.73</td>
</tr>
<tr>
<td>Perceived enjoyment (Davis et al., 1992)</td>
<td>I have fun using the ERP systems Using the ERP systems is pleasant I find using the ERP systems to be enjoyable</td>
<td>0.98</td>
</tr>
<tr>
<td>Perceived ease of use (Davis, 1989)</td>
<td>Learning to use the ERP system is easy for me I find it easy to get the ERP system to do what I want it to do My interaction with the ERP system is clear and understandable I find the ERP system is easy to use</td>
<td>0.83</td>
</tr>
<tr>
<td>Perceived usefulness (Davis, 1989)</td>
<td>Using the ERP system would improve my performance in my job Using the ERP system in my job would increase my productivity Using the ERP system would enhance my effectiveness in my job I find the ERP system would be useful in my job</td>
<td>0.91</td>
</tr>
</tbody>
</table>

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