Intrinsic Motivation toward Using Information Systems: A Rich Conceptualization and Empirical Test

Abstract

Information System (IS) studies traditionally conceptualize and operationalize 'intrinsic motivation toward using systems' as perceived enjoyment (PE). Enlightened by Vallerand's (1997) theorization, we develop a tri-dimensional, second-order construct – *Rich Intrinsic Motivation* (RIM), specifically targeting at mandatory use contexts (e.g., workplaces). RIM contains three aspects: intrinsic motivation toward accomplishment (IMap), to know (IMkw), and to experience stimulation (IMst), where IMst is analogous to the traditional PE conceptualization. We validated RIM with data from a large telecom service company that has implemented CRM systems. Our results support validity and reliability of RIM and illustrate its superiority over PE in predicting user attitude.

Key words: intrinsic motivation, information system use, mandatory context

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1. Introduction

The Motivation theory, which originated from social psychology, plays a significant role in explaining individual technology use in information system (IS) research (Venkatesh, Morris, Davis, & Davis, 2003). In general, intrinsic motivation is a state of mind wherein people perform an activity for the sheer joy or satisfaction of performing the activity; extrinsic motivation refers to a state wherein people perform tasks in order to gain some benefits by doing so, such as rewards, money, etc. (Deci & Ryan, 2002). In the context of IS in particular, 'intrinsic motivation toward using systems' is captured by perceived enjoyment (PE) experienced by users during the process of use (Davis, Bagozzi, & Warshaw, 1992). On the contrary, extrinsic motivation is represented by perceived usefulness (PU) – users' perception that using the systems would be instrumental in enhancement of performance, pay, or promotion (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; 1992).

While this perception of motivation has been widely used in understanding voluntary acceptance/use behavior in IS research (e.g. Dinev & Hart, 2006; Hong & Tam, 2006; Wasko & Faraj, 2005), its role in a mandatory context has received limited attention. Critical enterprise systems targeted at core business processes, such as customer relationship management and supply chain management, are resource-intensive initiatives; their use by employees is usually mandated by top management and, as a result, in workplaces, employees are often required and

expected to use the systems as part of their job duties (Hsieh & Wang, 2007; Nah, Tan, & Teh, 2004; Seddon, 1997). In such mandatory situations, users hold a more passive stance toward using systems than they do in a voluntary context (Wang & Hsieh, 2006). Further, given the utilitarian focus of organizational information systems, PE seems less relevant than PU in workplaces (e.g., van der Heijden, 2004). Consequently, we cannot help but ask the following questions: Does perceived enjoyment really impact usage behavior in the mandatory context? Does perceived enjoyment fully capture users' intrinsic motivational state in the mandatory context, or is a refined conceptualization warranted? And, are there sources, other than using the system itself, that could generate a feeling of enjoyment while using the system?

In order to answer these questions, we develop and validate the Rich Intrinsic Motivation (RIM) construct. For developing our theoretical framework, we draw on general motivation theory in social psychology, and appropriate the tri-dimensional intrinsic motivation concept of Vallerand (1997). We suggest that the three dimensions of RIM are intrinsic motivation toward accomplishment (IMap), intrinsic motivation to know (IMkw), and intrinsic motivation to experience stimulation (IMst). We propose that, compared with 'perceived enjoyment', RIM better describes users' motivation toward using information systems. We argue that RIM is useful to understand usage behavior in mandatory situations where users' initial acceptance is mandated by organizations. RIM surpasses the notion of 'perceived enjoyment'; individual users' satisfaction and enjoyment emerge from not only the physical amusement sensations when using the systems, but also other sources, like the sense of fulfillment and accomplishment when they are learning, exploring, or even innovating with systems.

Our study expects to contribute to IS research in two aspects. First, we extend the intrinsic motivation theory to the mandatory IS context. While mandatory use situations are not uncommon in organizations, understanding of individual motivational state under such circumstances is still limited. This study expects to enrich both theoretical and empirical knowledge on mandatory use through the motivation perspective.

Second, we develop and validate RIM as a tri-dimensional construct, specifically targeting at explaining individual system usage behavior. Drawing on social psychology literature, we believe the RIM concept would better represent the motivational state of individual system users, as compared to the traditional notion of intrinsic motivation, i.e. 'perceived enjoyment' (Davis et al., 1992). Thus, we expect the RIM concept to offer a more comprehensive perspective of an individual's motivational state toward using systems.

We provide a relatively thorough literature review of IS studies on intrinsic motivation, and then develop and validate RIM as a tri-dimensional construct. Finally, we discuss its implications for theory and practice.

2. Intrinsic Motivation as Perceived Enjoyment

We identified a total of 16 papers that have examined intrinsic motivation, in premier IS or IS related journals, including *MIS Quarterly*, *Information Systems Research*, *Journal of Management Information Systems*, *Management Science*, *and Journal of Applied Social Psychology*. Table 1 summarizes important aspects of these papers.

Insert Table 1 about here

Based on the motivation theory, Davis et al. (1992) were among the first to position perceived enjoyment (PE) as intrinsic motivation, and perceived usefulness (PU) as extrinsic motivation. Since then, the concept of 'perceived enjoyment' has been widely applied in a variety of IS contexts, such as voluntary usage in workplaces (Davis et al., 1992; Venkatesh, 1999), home use (Brown & Venketesh, 2005; van der Heijden, 2004; Hsieh, Rai, & Keil, 2008; Venkatesh & Brown, 2001), e-commerce transactions (Kamis, Koufaris, & Stern, 2008; Dinev & Hart, 2006), adoption of mobile services (Fang, Chan, Brzezinski, & Xu, 2006; Hong & Tam, 2006), knowledge contribution in e-networks (Wasko & Faraj, 2005), knowledge transfer in complex information system implementation (Ko, Kirsch, & King, 2005), and open source software projects development (Roberts, Hann, & Slaughter, 2006; Shah, 2006). The only exception we found is Venkatesh (2000), who operationalized intrinsic motivation as 'computer playfulness'. Nevertheless, as Venkatesh (2000) notes, after users gain usage experiences, PE dominates playfulness, to determine the dependant variable (perceived ease of use).

Apart from the motivation theory, several studies have used the idea of hedonic and utilitarian values to explain the effects of intrinsic and extrinsic motivations (Brown & Venketesh, 2005; van der Heijden, 2004; Hsieh et al., 2008; Venkatesh & Brown, 2001). While perceived enjoyment typically symbolizes hedonic value, perceived usefulness is usually associated with utilitarian value (Davis et al. 1992; Shah, 2006; Venkatesh & Brown, 2001).

Further examination of studies summarized in Table 1 reveals that, 1) intrinsic motivation exerts a positive impact in all investigative contexts, and 2) all investigative contexts of these papers concern *volitional* behavioral choices. That is to say, PE plays an important role when individuals are free to make their usage decisions, without any policy stipulations regarding the usage behavior. Admittedly, PE is a salient determinant of individual use. The pleasant sensational experiences of system use effectively drive users' interest, ease their cognitive burden, nurture positive attitude toward using systems, and boost use intentions, all of which enhance usage behavior. Particularly in the case of hedonic information systems, the amusement perceived by users can be a critical factor leading to individual use intentions (van der Heijden, 2004).

However, it is suggested that intrinsic motivation in utilitarian contexts (e.g., workplaces) should be distinguished from intrinsic motivation in hedonic contexts (Thomas & Velthouse, 1990). Following this line of reasoning, intrinsic motivation toward using systems in workplaces, especially in mandatory contexts, is also different from intrinsic motivation toward usage in hedonic contexts (van der Heijden, 2004). This does not imply denying the importance of intrinsic motivation in workplaces; rather, we suggest that a more inclusive and precise conceptualization of intrinsic motivational state in workplaces is warranted. In the mandatory context, users may hardly find using systems to be funny and amusing, but still system use in itself can be enjoyable due to the meaningfulness, satisfaction, and fulfillment experienced by users throughout the usage process. In fact, quite a few theories have explained such a motivational state. For example, Maslow's (1970) 'hierarchy of needs' posits that people's endeavor and persistence can come from such higher-order needs as self-actualization and/or

self-esteem. Echoed by the self-determination theory (Deci & Ryan, 2002; Vallerand, 1997), intrinsic motivation can easily be triggered by people's 'basic psychological needs' like autonomy and competence. As these are also powerful sources that stem from innate needs, Vallerand (1997) integrated these sources and proposed a tri-dimensional intrinsic motivation concept for explaining human behavior in general.

3. A Rich Conceptualization of Intrinsic Motivation (RIM)

In social psychology literature, Vallerand and his colleagues propose a tri-dimensional intrinsic motivation concept – intrinsic motivation toward accomplishments (IMap), intrinsic motivation to know (IMkw), and intrinsic motivation to experience stimulation (IMst) (Vallerand, Blais, Briere, & Pelletier, 1989; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992, 1993). According to Vallerand, prior psychology studies have usually examined only one of the three aspects of intrinsic motivation, and very few have taken an integrated perspective. Therefore, Vallerand and his colleagues, after classifying and synthesizing the relevant literature, validated a tri-dimensional intrinsic motivation conceptualization across various research fields (Vallerand & Briere, 1990; Vallerand, Blais, Briere, & Pelletier, 1989).

Although not inspired by a single over-arching theory, the three dimensions do incorporate almost all types of intrinsic motivation discussed in the literature (Vallerand et al. 1989). IMap refers to the pleasure and satisfaction experienced while one is attempting to strive beyond oneself, to achieve, or innovate something (e.g., Kagan, 1972; Nicholls, 1984; White, 1959). IMkw is the enjoyment one experiences when learning or exploring things (e.g., Berlyne, 1971; Brophy, 1987; Harter, 1981). The last dimension, IMst pertains to the intense pleasant feelings

associated with performing certain activities (e.g., Csikszentmihalyi, 1978; Zuckerman, 1979). Moreover, similar rationales are confirmed by Malone's (1981) theory of intrinsic motivating instruction. Malone proposed three types of intrinsic motivating factors in computer games: challenge, curiosity, and fantasy (also see Piaget, 1951, 1952, 1971). It is quite apparent that the three 'intrinsic motivating factors' are similar to the three dimensions addressed by Vallerand, i.e. intrinsic motivation toward accomplishments – challenge, intrinsic motivation to know – curiosity, and intrinsic motivation to experience stimulation – fantasy.

Due to the inclusive nature of the tri-dimensional intrinsic motivation concept, we appropriate it as RIM for the IS context (Table 2). From the viewpoint of individual IS users, IMap is defined as the pleasure and satisfaction that they experience when solving problems or overcoming difficulties in using systems, or innovatively using systems features; IMkw signifies the pleasure and satisfaction that they experience when exploring the systems, or learning to use new features; and IMst refers to the pleasure and satisfaction that users experience when using the systems.

Insert Table 2 about here

The first two dimensions, IMap and IMkw, focus on the enjoyable feelings while using the systems where system use satisfies one's higher-order needs; the third dimension, IMst, represents the 'pleasant sensations associated mainly with one's senses' as derived from the process of using the systems (Vallerand, 1997, p.280). We propose that IMst is analogous to the traditional 'perceived enjoyment' theorization in IS literature, because both emphasize the joy sensations derived from experiencing/performing a particular activity. Further, as noted by

Venkatesh (1999), the enjoyment and playfulness in computer training programs capture primarily the fantasy aspect, i.e. IMst, but not the challenge and curiosity aspects.

Indeed, PE serves as a more salient determinant of hedonic use than of utilitarian use in IS literature (van der Heijden, 2004; Fang et al., 2006). Nevertheless, we maintain that RIM makes significant contributions toward enhancing individual usage behavior in workplaces, especially when system usage is mandated. Apart from the fun and joy, the sense of accomplishment users get when they successfully overcome difficulties in using systems, enhances users' self-efficacy, satisfies their basic psychological need for competence, and further encourages individuals to use systems for job performance. Also, the satisfaction associated with learning and exploration nurtures users' positive attitude and perception about the systems, helps them better understand system values, and ultimately contributes to system use. In other words, RIM captures an augmented appreciation of users' intrinsic motivational state toward using information systems.

4. Validating RIM

4.1 Study Context and Sample

We focus on employee use of Customer Relationship Management (CRM) information systems in an organizational setting in China, where use of CRM systems by employees is mandated by the management. In general, CRM is designed to facilitate management of long-term customer relationships by developing and operationalizing huge customer databases (Kim, Choi, Qualls, & Park, 2004), which mainly contain contact information, customer preferences, and historical service records. Since 1990s, these systems have been adopted by organizations to sharpen their

competitive edge (Rigby & Ledingham, 2004). Employees, usually after receiving training, are mandated to use the implemented CRM systems for their duties and tasks, so as to meet management requirements (McCalla, Ezingeard, & Money, 2003). Trend-setting corporations in industries such as banking and telecommunications in China are among the first to have invested significant resources to implement these systems.

We selected one of the largest telecommunication services companies in China for the empirical study. We developed a survey instrument to collect quantitative data for empirical investigation. In the pilot test, we invited 20 employees from the sample firm to complete the questionnaire. Based on this limited data, we observed that psychometric properties of all variables were good. We also used informal qualitative feedback from the 20 participants to refine the content validity of each of the dimensions of the RIM construct (Section 4.2.1). We then administered questionnaires to a total of 346 individual CRM users in the same company, out of which 244 responded. Demographic information of respondents is presented in Table 3.

Insert Table 3 about here

4.2 RIM as a Second-Order Construct

Although some earlier studies in organizational behavior (OB) research integrate the three dimensions into a single scale for model testing (e.g., Van Yperen & Hagedoorn, 2003), we conceive RIM as a second-order construct. Specifically, the three dimensions at the second-level (i.e. IMap, IMkw, and IMst) formatively compose RIM, while the measures for each dimension at the first-level are reflective in nature (Figure 1).

Insert Figure 1 about here

According to Jarvis, MacKenzie, & Podsakoff (2003) and Petter, Straub, & Rai (2007), measures for a construct are formative if (1) the causal direction is from indicators to the construct; (2) indicators are not necessarily interchangeable; (3) co-variations among indicators are not necessary; and (4) the nomological network of indicators may vary (Jarvis et al. 2003). These four criteria all suggest that the three dimensions of RIM are essentially formative. First, as noted earlier, the three dimensions of RIM (IMap, IMkw, and IMst) are distinct sources for users' enjoyment feelings. The experiences of accomplishing difficulties in using the systems, knowing more about using them, and immersing in using the systems, generate, rather than result from, pleasant feelings and satisfaction in users. Second, IMap, IMkw, and IMst represent three different reasons for users' joyful experience of using the systems and are, therefore, not substitutable; deletion of any one dimension distorts the meaning of the RIM construct as a whole. Third, the three dimensions do not necessarily covary with each other. For instance, it is possible that change in a user's physical pleasant sensation while using a system (IMst) will not affect, or be affected by, change in his/her satisfaction derived from solving problems by using the system (IMap). Fourth, the three dimensions of RIM tend to have common, as well as distinct, antecedents and consequences. For example, a user with high self-esteem with respect to his/her IS capability, is inclined to be satisfied when successfully overcoming difficulties in using the systems (IMap); such a user is unlikely to experience much enjoyment when simply applying the systems (IMst) or exploring them (IMkw) on job. We thus specify RIM as a second-order construct, which consists of three formative dimensions (IMap, IMkw, and IMst), with each dimension as reflective at the first level.

4.2.1 Content Validity

Content validity stands for the degree to which measurement items have properly captured the full domain of a construct (Straub, Boudreau, & Gefen, 2004). Content validity of RIM is ensured by the original motivation literature from social psychology field. Vallerand and his colleagues (Vallerand, Blais, Briere, & Pelletier, 1989; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992; 1993), by reviewing and synthesizing existing motivation literature, developed and validated the tri-dimensional intrinsic motivation concept and its measures across different research disciplines (Vallerand & Briere, 1990; Vallerand et al., 1989). As mentioned earlier, the tri-dimensional conceptualization is consistent with Malone's (1981) theory of intrinsic motivating instruction, which is also established through a meta-review approach. Hence, the tri-dimensional nature of intrinsic motivation is not only supported by traditional psychology literature, but also confirmed by related IS research.

At a measurement level, we assess IMap and IMkw by adapting items from Vallerand (1997), and evaluate IMst by using Davis et al.'s (1992) PE items. The reasons for not using Vallerand's IMst items are as follows. One, the items for PE (Davis et al. 1992) can more precisely capture individuals' physical 'enjoyment sensation' dimension than if we contextualize the original items of IMst for the IS context (Vallerand, 1997). Previously, we have argued that the dimension of IMst from Vallerand (1997) appears very similar to PE developed by Davis et al. (1992). The only difference is that IMst by Vallerand (1997) explicitly denotes *intense* pleasant feelings, while PE by Davis et al. (1992) refers to *general* enjoyment and fun. We downplay the 'intense' aspect of enjoyment because it is understandable that enjoyment in workplaces can hardly be

comparable to the *intense* enjoyment/fun one could experience in certain hedonic activities like roller-coaster rides, chess, or sudoku games. This is also confirmed by the 20 participants in the pilot test. Two, quite a few of IS studies have validated the PE items (Table 1) and rendered reliable results. Three, measuring the PE items as one dimension of RIM also facilitates statistical comparison between RIM and PE constructs in terms of their predictive validity. Therefore, the items of PE were adapted to operationalize the IMst dimension.

4.2.2 Construct Validity

We use Partial Least Square (PLS), a component-based Structural Equation Modeling (SEM) technique, to examine the construct validity of RIM. We adopt SmartPLS as the analytical software. We use PLS as it does not have constraints for model identification, accommodates formative measurement models effectively with minimal constraints that can change the meaning of the model, and is especially suitable for theoretical development purposes (Chin, 1998; Jarvis et al., 2003; Peter et al., 2007).

Cronbach's alpha, composite reliability, weight, and average variance extracted (AVE) were evaluated for all three dimensions, i.e. IMap, IMkw, and IMst (Fornell & Larcker, 1981). As shown in Table 4, values of Cronbach's alpha and composite reliabilities of all dimensions are higher than the recommended 0.707 (Nunnally, 1994); AVEs are well above the threshold of 0.50 (Fornell & Larcker, 1981). Both facts indicate internal consistency of the three dimensions of RIM.

Besides, the dimensionality of RIM is also strongly supported because 1) the value of AVE of any dimension appears higher than its squared correlations with others (Table 4), and 2) items loadings on their own dimensions are higher than their cross loadings on others (Table 5) (Chin 1998).

Insert Table 4 about here

Insert Table 5 about here

To examine the robustness of the results, we also applied covariance-based SEM (AMOS 16.0) to validate the RIM model. In this approach, an unconstrained measurement model is compared with measurement models wherein certain correlations are fixed. Discriminant validity of factors is supported when the unconstrained model displays significantly better fit, compared to constrained models (Chang & King, 2005; Kanawattanachai & Yoo, 2007). Table 6 lists fit indices of unconstrained (Model 1a in Figure 2) and constrained models (Model 1b – 1d in Figure 2)[1]. Models are compared by performing a chi-square test (degree of freedom = 1). Model 1a displayed significantly better fit than any of the other three models.

Insert Figure 2 about here

Insert Table 6 about here
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[1]According to the reported modification indices, we improved the model fit of Model 1a by correlating the error terms of the third and fourth IMap items. Reddy (1992) noted that correlating within-construct measurement errors helps improve measurement model fit indices, while is impartial from inflating structural relations (Stanton, Bachiochi, Robie, Perez, & Smith, 2002).

In conclusion, the conceptualization of the RIM construct received support from results obtained from both component-based SEM, and covariance-based SEM.

4.2.3 Construct Reliability

Since formative measures are ideally unrelated to each other, their reliability is higher when there is none or little multicollinearity among them (Petter et al., 2007; Jarvis et al., 2003; MacKenzie et al., 2005). Variance inflation factor (VIF) is an effective indicator for multicollinearity; a VIF value smaller than 3.3 denotes factors as free from significant muticollinearity (Diamantopoulos & Siguaw, 2006; Mathienson, Peacock, & Chin, 2001). We performed a regression of the three dimensions of RIM against a dependent variable ('user attitude', rationale elaborated in the next section). The VIFs ranged from 1.515 to 1.599, suggesting limited or no multicollinearity among the RIM dimensions.

4.3 RIM in A Nomological Net

After validation of the second-order measurement of the RIM construct, we proceed to investigate its nomological validity. We chose user attitude (ATT) as the dependent variable, as in technology acceptance model (TAM), it is an important mediator that links perceived usefulness (PU) and perceived ease of use (PEOU) to behavioral intention (Davis, Bagozzi, & Warshaw, 1989; 1992). Further, in the mandatory context, usage behavior tends to display less variance (Seddon, 1997); only attitude is relatively freely expressed. Hence, instead of directly associating RIM with behavior or behavioral intention, we examine the impact of RIM on user attitude. To rule out possible alternative explanations, we controlled for some important factors,

including PU, PEOU, demographic factors (i.e. age, gender, and education), use experience, and work experience. Figure 3 demonstrates the complete nomological net.

Insert Figure 3 about here

Altogether, we examined six models using SmartPLS (Figure 4). Model 2a tests the original TAM model, without incorporating intention and behavior (Davis et al., 1989); Model 2b, based on TAM, adds IMst, i.e. perceived enjoyment (PE), as the intrinsic motivator (also see Davis et al. 1992); Model 2c and 2d, each incorporates one additional dimension of RIM based on Model 2b, i.e. IMap and IMkw; Model 2e and 2f include all three dimensions of RIM – Model 2e treats the three dimensions as separate component; Model 2f models RIM as a second-order construct (Figure 3). Table 7 shows the statistical results of all six models, including path coefficient, significance, and the explained variance of dependent variables; Figure 5 illustrates the details in graphics.

Insert Figure 4 about here

Insert Table 7 about here

Insert Figure 5 about here

Since all data were obtained from end-users through a single survey, we evaluate the threat of common method bias by using the common method approach from Liang, Saraf, Hu, & Xue (2007). Inclusion of a common method construct in the nomological net did not change the significance of any of the paths in the original model, indicating no significant common method

bias in our data. The Harmon one-factor test recommended by Podsakoff and Organ (1986) was also performed. A factor analysis combining all items in the nomological net revealed no sign of a single-factor accounting for the majority of the covariance. The above evidence collectively suggests that common method bias is not a significant issue in this study.

The findings supported the nomological validity of RIM and, more importantly, proved the superiority of RIM over the single dimension, IMst (PE). As shown in Table 7, when adding IMst (Model 2b) to TAM (Model 2a), explained variance of ATT changed by only 0.8%; IMst exerted a moderate impact on ATT. In Model 2c, when adding RIM (Model 2f) to TAM (Model 2a), explained variance of ATT jumped from 49.3% to 53.9%, increasing by 4.6 percentage points. Further, in Model 2f, where RIM was modeled as a second order construct, the path coefficient from RIM to ATT (β = 0.348**) is even higher than the one from PU to ATT (β = 0.231**).

Moreover, following the approach by Burton-Jones and Straub (2006), we investigated the predictive power of IMap and IMkw. By comparing Model 2e and 2f with Model 2b, we found that the tri-dimensional RIM construct significantly improves the explained variance of ATT (small-to-medium effect size) (Table 8). Further, R^2 of ATT also increased considerably when either dimension of IMap or IMkw is added to the original IMst (small-to-medium effect size) (Table 8).

Insert Table 8 about here

The empirical evidence provides robust support to nomological validity of the tri-dimensional, second-order RIM construct. The three dimensions jointly capture the motivational state of individuals toward using systems in workplaces. By adding IMap and IMkw to the original IMst (PE) conceptualization, we advance the knowledge of 'intrinsic motivation toward using systems' in IS context. Finally, we discuss the implications of our research for theory and practice in depth.

5. Discussion

We developed and validated a rich intrinsic motivation (RIM) concept. In addition to the traditional 'perceived enjoyment' conceptualization (intrinsic motivation to experience stimulation in RIM – IMst), we added two other dimensions, intrinsic motivation toward accomplishment (IMap) and intrinsic motivation to know (IMkw), to better capture individual intrinsic motivational state in using information systems, particularly in the mandatory context. Appropriated from the general tri-dimensional intrinsic motivation concept (Vallerand, 1997), RIM aligns and integrates the conceptualization of intrinsic motivation across social psychology and information systems literatures.

In addition, we validated RIM in an organizational IS use setting, rather than in a home, or any other non-workplace settings. The IS literature usually regards hedonic value (i.e. perceived enjoyment) as a synonym for intrinsic motivation (Brown & Venkatesh, 2005; Hsieh et al., 2008; Venkatesh & Brown, 2001). Van der Heijden (2004) further posits that utilitarian value (perceived usefulness) tends to dominate the use of utilitarian systems, while hedonic value (perceived enjoyment) will primarily drive the use of hedonic systems. However, we argue that

intrinsic motivation also matters for utilitarian systems' use, and that perceived enjoyment can not precisely represent intrinsic motivation in workplaces. Specifically, we make the point that intrinsic motivation toward using systems is composed of enjoyment not only from the activity of using the system, but also from the satisfaction and fulfillment users feel when they overcome difficulties or learn new things in using the systems. By reconceptualizing 'intrinsic motivation toward using systems' as a tri-dimensional construct, we enrich our understanding of intrinsic motivation in IS context.

Future research may continue studying RIM by comparing users' intrinsic motivational state when using different systems. While it is true that all the three dimensions together establish the RIM concept, we suspect that, for different information systems, different dimensions may dominate in driving specific usage behaviors. For example, in this study, we found IMap to exert the most influence on user attitude in workplaces. However, when considering hedonic systems, users may be mostly encouraged by their amusement experiences with systems (van der Heijden, 2004).

Further, utilitarian systems can be either voluntary (Davis et al., 1992; Venkatesh, 2000) or mandatory (Hsieh & Wang, 2007). Despite the popularity of 'perceived enjoyment' as intrinsic motivation in technology acceptance literature, we still recommend that interested researchers investigative 1) the applicability and superiority of RIM in the voluntary context, and 2) users' motivational differences in voluntary and mandatory contexts.

Last but not the least, the RIM concept, denoting 'intrinsic motivation toward using systems', only targets the general context of system use. As can be seen in Table 1, intrinsic motivation as 'perceived enjoyment' has been widely accepted in various IS contexts, e.g., information system project development (Wasko & Faraj, 2005; Ko et al., 2005), knowledge management (Roberts et al., 2006; Shah, 2006), etc. Given the significance of RIM in this study, we suggest that researchers apply the tri-dimensional intrinsic motivation concept from Vallerand (1997) to other IS contexts in the future, especially those contexts where motivation is a salient issue.

In terms of practical implications, implementation of information systems at the organizational level ultimately concerns end-user acceptance (Jasperson, Carter, & Zmud, 2005). How to motivate individual usage behavior in mandatory contexts has long been a challenging topic among managers. RIM should broaden managers' view regarding the sources of users' enjoyment feelings when using systems in workplaces. Individual users' joyful experiences not only come from the amusement sensations derived from using systems, but can also result from the sense of accomplishment when learning, exploring, or even innovating with systems. Therefore, managers can facilitate individual IS acceptance in three aspects. First, as already confirmed by the 'hedonism' literature (Venkatesh, 1999; van der Heijden, 2004), individual usage behavior can be enhanced by offering a more entertaining user interface, or fantasy training programs (Venkatesh, 1999). More importantly, as our results suggest, managers should make available needed resources to assist users when they encounter difficulties in using systems, and to further their intrinsic motivation for accomplishment. Third, managers may also endeavor to nurture a learning culture in organizations. In an organization with a learning culture, users with high level of curiosity (i.e. intrinsic motivation to know) will feel satisfied and motivated

because all co-workers are always ready to learn and share knowledge with each other in such organizations.

Like most research, our study has its limitations. First, the RIM concept is validated by data for a specific system, in a single firm. While the confounding effects are controlled by collecting data from a single site, caution should be exercised when generalizing the findings to other systems and organizational contexts. It is also noteworthy that young female employees accounted for more than three quarters of the total sample (see Table 3), which is representative for the composition of service personnel in telecommunication companies in China. While age and gender could be influential toward system use (e.g., Morris & Venkatesh, 2000; Venkatesh & Morris, 2000), both were treated as a control variable in our study and showed no salient impact on the dependent variable (see Table 7). Besides, the cultural difference between east and west is another concern with respect to generalization. We thus call for future empirical validations of RIM in other system, organizational, and cultural contexts.

Moreover, we admit that the selection of user attitude as the dependent variable to evaluate the nomological validity of RIM has its limitations. Nevertheless, attitude is an important antecedent for various important perceptions and behaviors in organizations, e.g., individual organizational citizenship behavior (Bettencourt, Gwinner, & Meuter, 2001; Podsakoff, MacKenzie, Paine, & Bachrach, 2000), and organization performance (Ostroff, 1992). Further, as a rich taxonomy including user, system, and task, 'system use' can have alternative interpretations and definitions (Burton-Jones & Straub, 2006). In other words, with specific regard to IS context, we suspect that user attitude matters for the quality of use, rather than the lean use frequency or duration. An

intrinsically motivated individual user, having a relatively more positive attitude toward using the systems, would also display greater tendencies to use systems in a more productive manner (Wang & Hsieh, 2006).

6. Conclusion

This paper develops and validates a rich intrinsic motivation (RIM) concept in IS context. Prior IS studies commonly operationalize 'intrinsic motivation toward using systems' as perceived enjoyment, which appears too lean to capture the full picture of system end-users' intrinsic motivational state in workplaces where information systems are usually mandated by top management. Drawing on Vallerand's (1997) tri-dimensional intrinsic motivation concept, we have conceptualized 'intrinsic motivation toward using systems' as a tri-dimensional, second-order construct, i.e. Rich Intrinsic Motivation (RIM). The three dimensions of RIM are intrinsic motivation toward accomplishment (IMap), intrinsic motivation to know (IMkw), and intrinsic motivation to experience stimulation (IMst). Beyond the IMst, which is similar to the notion of 'perceived enjoyment' in prior IS research, the two additional dimensions, IMap and IMkw, individually and significantly strengthen the predictive power of RIM in the technology acceptance nomological network (TAM). The RIM concept also offers managerial insights concerning how to intrinsically motivate employees to use information systems in organizations.

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Table 1. IS Studies on Intrinsic Motivation

Source	IM Definition	IM Measurements	Dependant Variables	Findings	Context
Brown & Venkatesh (2005)	• Intrinsic motivation: hedonic outcomes (enjoyment and playfulness)	1. Davis et al. 1992; Venkatesh and Speier 1999, 2000 2. The computer provides many applications that are enjoyable. 3. I enjoy playing computer games. 4. My computer has applications that are fun. 5. I am able to use my computer to have fun.	Behavioral intention	- Age negatively moderated the relationship between application for fun and adoption intention.	Home use
Davis et al. (1992)	• Intrinsic motivation: perceived enjoyment – the extent to which the activity of using a technology is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated.	1. I find using XXX to be enjoyable (likely/ unlikely). 2. The actual process of using XXX is (unpleasant/ pleasant). 3. I have fun using XXX (likely/ unlikely).	Behavioral intention	- Enjoyment had a significant impact on behavioral intention, controlling for perceived usefulness. - Enjoyment and perceived usefulness interactively influenced behavioral intention. - Enjoyment mediated the influence of perceived ease of use on behavioral intention.	Voluntary use in workplace
Dinev & Hart (2006)	• Intrinsic motivation – personal Internet interest: the degree of cognitive attraction to Internet interactions.	1. I find that personal interest in the information that I want to obtain from the Internet overrides my concerns of possible risk or vulnerability that I may have regarding my privacy. 2. The greater my interest in obtaining a certain information or services from the Internet, the more I tend to suppress my privacy concerns. 3. In general, my need to obtain certain information or services from the Internet is greater than my concern about privacy.	Willingness to provide personal information to transact on the Internet	- Personal Internet interest positively influenced the willingness to provide personal information to transact on the Internet.	E-commerce transactions
Fang et al. (2006)	• Intrinsic motivation: perceived playfulness – the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use.	Venkatesh 1999, 2000 1. I find this task interesting and enjoyable. 2. I do not realize the time elapsed when performing this task.	Intended use	- The intention to perform gaming tasks on handheld devices is positively influenced by perceived playfulness.	Mobile commerce context
Hsieh et al. (2008)	• Intrinsic motivation: hedonic outcomes – the pleasure and	Davis 1989; Venkatesh 1999; Venkatesh and Brown 2001	Continuance use	- Perceived enjoyment affected continued use intention of the	A city government

	inherent satisfaction derived from performing the behavior of interest.	1. Using the Internet TV is enjoyable. 2. Using the Internet TV is pleasant. 3. Using the Internet TV is fun.	intention	socially-economically disadvantaged group.	project (free access to Internet)
Hong & Tam (2006)	• Intrinsic motivation: perceived enjoyment – the extent to which the activity of using an innovation is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated.	Davis et al. 1992 1. I expect that using MDS would be enjoyable. 2. I expect that using MDS would be pleasurable. 3. I expect to have fun using MDS. 4. I expect that using MDS would be interesting.	Behavioral intention	- Perceived enjoyment influenced behavioral intention directly and indirectly through PU and PEOU	Adoption of multipurpose information appliances in nonwork settings (mobile data services)
Igbaria et al. (1996)	• Intrinsic motivation: perceived fun/ enjoyment – an intrinsic motivation for the use of micro computers (Davis et al. 1992)	Davis et al. 1992 Using a microcomputer in my job is: 1. pleasant/ unpleasant 2. enjoyable/ frustrating 3. enjoyable/ unenjoyable	System use	- Perceived enjoyment positively related to microcomputer usage.	Microcomputer usage
Kamis et al. (2008)	• Intrinsic motivation: perceived enjoyment – the intrinsic enjoyment of the interaction with the website.	Davis et al. 1992 1. While using the web site, I found my visit interesting. 2. While using the web site, I found my visit enjoyable. 3. While using the web site, I found it to be fun.	Intention to purchase & intention to return	- Perceived enjoyment fully mediated the DSS interface design on behavioral intention (intention to purchase and intention to return). - Perceived enjoyment for all users followed an inverted U-shaped curve as the choice set size increased.	Customizing products online with attribute-based decision support systems (ABDSS)
Ko et al. (2005)	• Intrinsic motivation: deriving satisfaction that lies in the content of the activity itself. • Extrinsic motivation.	Amabile et al. 1994 1. I enjoy learning business and technical knowledge about *(Purchasing)* module. 2. The more difficult it is to understand business and technical knowledge about the *(Purchasing)* module, the more I enjoy learning it. 3. I enjoy learning business and technical knowledge about the *(Purchasing)* module that are completely new to me. 4. I have to feel that I'm personally benefitting from learning business and technical knowledge about the *(Purchasing)* module. 5. I want to find out how good I really can be at learning business and technical knowledge about the *(Purchasing)* module.	Knowledge transfer	- Intrinsic motivation from both clients and consultants positively contributed to knowledge transfer. - Extrinsic motivation did not contribute.	Knowledge transfer in complex information system implementation

		6. I'm more comfortable when I can set my own goals for learning business and technical knowledge about the *(Purchasing)* module.			
Roberts et al. (2006)	• Intrinsic motivation: the extent to which participants make code contributions because developing software is an activity they enjoy and one that satisfies their needs for accomplishment, control or autonomy. • Extrinsic motivation: use value and status	Adapted from subscales of the *Multi-Item Measures of Values* instrument (Herche 1994) and the *Job Diagnostic Survey* (Hackman and Oldham 1974), including Task Identity, Task Significance, and Autonomy. 1. It is the satisfaction of seeing the results. 2. It gives me the chance to do things I am good at. 3. I really enjoy it. It is fun. 4. It gives me a sense of personal achievement.	Individual performance mediated by participation	- Extrinsic motivation did not undermine intrinsic motivation - Status motivation (one aspect of extrinsic motivation) enhanced intrinsic motivation. - Intrinsic motivation did not have significantly impact participation.	Open source software projects development
Shah (2006)	• Intrinsic motivation – fun and enjoyment derived from participation • Extrinsic motivation – need-driven	Qualitative analysis: interviews, mailing list postings, and online project documentation	Participation	- The hobbyist group displayed high level of participation, and long-term commitment.	Open source software development
van der Heijden (2004)	• Intrinsic motivation: perceived enjoyment – the extent to which fun can be derived from using systems	Cheung et al. 2000; Igbaria et al. 1995 1. enjoyable – disgusting 2. exciting – dull 3. pleasant – unpleasant 4. interesting – boring	Behavioral intention	- For hedonic systems, perceived enjoyment and perceived ease of use were stronger determinants of intention to use than perceived usefulness.	Hedonic systems
Venkatesh (1999)	• Intrinsic motivation: playfulness – capturing the fantasy aspect defined by Malone (1981)	Experiment Game-based training vs. traditional training	Behavioral intention mediated PEOU	- Game-based training, as compared with traditional training, improved users' behavioral intention, by increasing their perception of ease of use.	Game-based training
Venkatesh (2000)	• Intrinsic motivation: computer playfulness – the 'cognitive spontaneity' in computer interactions	Webster and Martocchio 1992 – computer playfulness The following questions ask you how you would characterize yourself when you use computers: 1) spontaneous 2) unimaginative 3) flexible 4) creative 5) playful 6) unoriginal 7) uninventive Davis et al. 1992 – enjoyment	Perceived ease of use	- Computer playfulness significantly influenced PEOU during the initial use stages. - Such impact diminished as usage experience increased. - Perceived enjoyment then took the dominant place of computer playfulness.	Voluntary use in workplace

		1. I find using the system to be enjoyable. 2. The actual process of using the system is pleasant. I have fun using the system.			
Venkatesh & Brown (2001)	• Intrinsic motivators: hedonic outcomes – the pleasure derived from PC use • Extrinsic motivators: utilitarian and social outcomes	Telephone interviews Key words implying hedonic outcomes: games, fun, enjoyment, and pleasure	Computer adoption intention and behavior	- Hedonic outcomes affected computer adoption among the adopters (vs. non-adopters).	Home use
Wasko & Faraj (2005)	• Intrinsic motivation – enjoy helping: the perception that helping others with challenging problems is interesting.	Constant et al. 1996 1. I like helping other people. 2. It feels good to help others on the Massage Board. 3. I enjoy helping others on the Message Board.	Knowledge contribution (helpfulness and volume)	- The 'enjoy helping' factor moderately impacted knowledge contribution (helpfulness). - Reputation, the other construct of motivation category, significantly affected knowledge contribution in terms of both contribution helpfulness and volume of contribution.	Knowledge contribution in electronic networks

Table 2. Conceptualizing the Three Dimensions in RIM

	Intrinsic Motivation (Vallerand 1997 p.280)	Intrinsic Motivation toward System Use
Intrinsic motivation toward accomplishments	The pleasure and satisfaction experienced while one is attempting to surpass oneself, or to accomplish or creating something	The pleasure and satisfaction experienced when solving problems or overcoming difficulties in using systems, or innovatively using system features
Intrinsic motivation to know	The pleasure and satisfaction that one experiences while learning, exploring, or trying to understand something new	The pleasure and satisfaction experienced when exploring systems, or learning to use new features
Intrinsic motivation to experience stimulation	Experienced pleasant sensations associated mainly with one's senses	The pleasure and satisfaction experienced when using systems

Table 3. Sample Demographics

Category		Frequency	Percentage (%)
AGE	25 or below	195	79.9
	26-30	36	14.8
	31-35	12	4.9
	36-40	0	0.0
	41 or above	1	0.3
	TOTAL	244	100.0
EDUCATION	Senior High School	43	17.6
	College	163	66.8
	Bachelor's Degree or above	38	15.6
	TOTAL	244	100.0
GENDER	Female	184	75.4
	Male	60	24.6
	TOTAL	244	100.0

Table 4. Cronbach's Alpha, Composite Reliability, Weight, AVE, & Squared Correlation

	Alpha	Composite Reliability	Weight	IMap	IMkw	IMst
IMap	0.901	0.890	0.437	***0.670***		
IMkw	0.901	0.904	0.348	0.476 (0.690)	***0.760***	
IMst	0.960	0.960	0.368	0.339 (0.582)	0.368 (0.607)	***0.890***

Notes: The diagonal elements are the AVEs; the off-diagonal elements are the squared correlations.

Table 5. Item Loadings and Cross Loadings

	IMap	IMkw	IMst
IMap1	0.88	0.61	0.55
IMap2	0.87	0.68	0.51
IMap3	0.87	0.60	0.49
IMap4	0.88	0.54	0.49
IMkw1	0.57	0.88	0.56
IMkw3	0.64	0.93	0.56
IMkw4	0.68	0.93	0.55
IMst1	0.56	0.58	0.95
IMst2	0.55	0.58	0.97
IMst3	0.57	0.59	0.97

Table 6. Validating RIM by Covariance-Based SEM

Fit Indices	**Model 1a** Correlations all set free	**Model 1b** Correlation of IMap & IMkw = 1	**Model 1c** Correlation of IMap & IMst = 1	**Model 1d** Correlation of IMkw & IMst = 1
χ^2	58.255	186.244	311.567	366.304
df	31	32	32	32
GFI	0.954	0.847	0.791	0.769
AGFI	0.919	0.737	0.642	0.603
CFI	0.988	0.931	0.875	0.851
RMSEA	0.060	0.141	0.190	0.207

Table 7. PLS Results of Structural Models

	Model 2a TAM	**Model 2b** + IMst	**Model 2c** + IMap & IMst	**Model 2d** + IMkw & IMst	**Model 2e** + IMap, IMkw, & IMst	**Model 2f** + RIM
Age	0.003	0.028	0.023	0.040	0.030	0.047
Education	0.041	0.028	0.028	0.050	0.038	0.033
Gender	0.028	0.041	0.051	0.054	0.056	0.061
Use experience	0.010	0.022	0.003	0.033	0.012	0.024
Work experience	0.139	0.115	0.126	0.129	0.131	0.115
PU	0.406**	0.359**	0.270**	0.263**	0.237**	0.231**
PEOU	0.368**	0.314**	0.245**	0.302**	0.249**	0.237**
PEOU → PU	0.622**	0.622**	0.622**	0.622**	0.622**	0.622**
IMap			0.278**		0.235**	$0.447_{(weight)}$
IMkw				0.212**	0.104	$0.342_{(weight)}$
IMst (PE)		0.128*	0.062	0.066	0.042	$0.363_{(weight)}$
RIM						0.348**
R^2 of PU		38.7%	38.7%	38.7%	38.7%	38.7%
R^2 of ATT	49.3%	50.1%	54.1%	52.2%	54.5%	53.9%

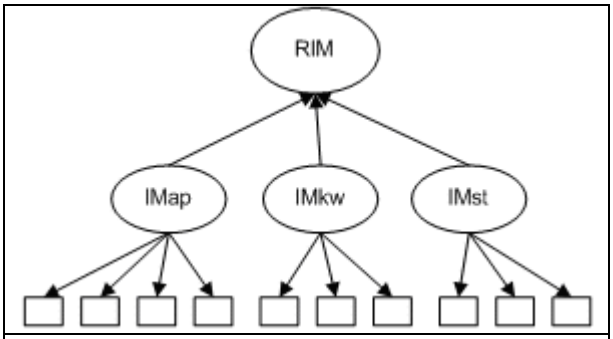
**: $p < 0.05$, *: $p < 0.1$
ATT: user attitude
IMst: intrinsic motivation to experience stimulation, i.e. perceived enjoyment
PEOU: perceived ease of use
PU: perceived usefulness
RIM: the second-order, formative rich intrinsic motivation construct

Table 8. Impact of Excluding RIM dimensions

Test	**Models Compared**		**Change in R^2**	**Effect Size**
	Full Model	**Partial (nested) Model**		
Impact of measuring IMap & Imkw	Model 2e	Model 2b	4.4%**	$f^2 = 0.097$ Small-medium
	Mode 2f	Model 2b	3.8%**	$f^2 = 0.083$ Small-medium
Impact of measuring IMap	Model 2c	Model 2b	4.0%**	$f^2 = 0.088$ Small-medium
Impact of measuring IMkw	Model 2d	Model 2b	2.1%**	$f^2 = 0.044$ Small-medium

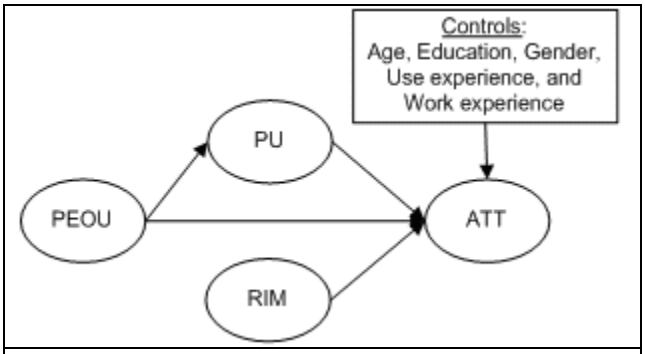
IMap: intrinsic motivation toward accomplishment
IMkw: intrinsic motivation to know

Figure 1. RIM as A Second-Order Construct



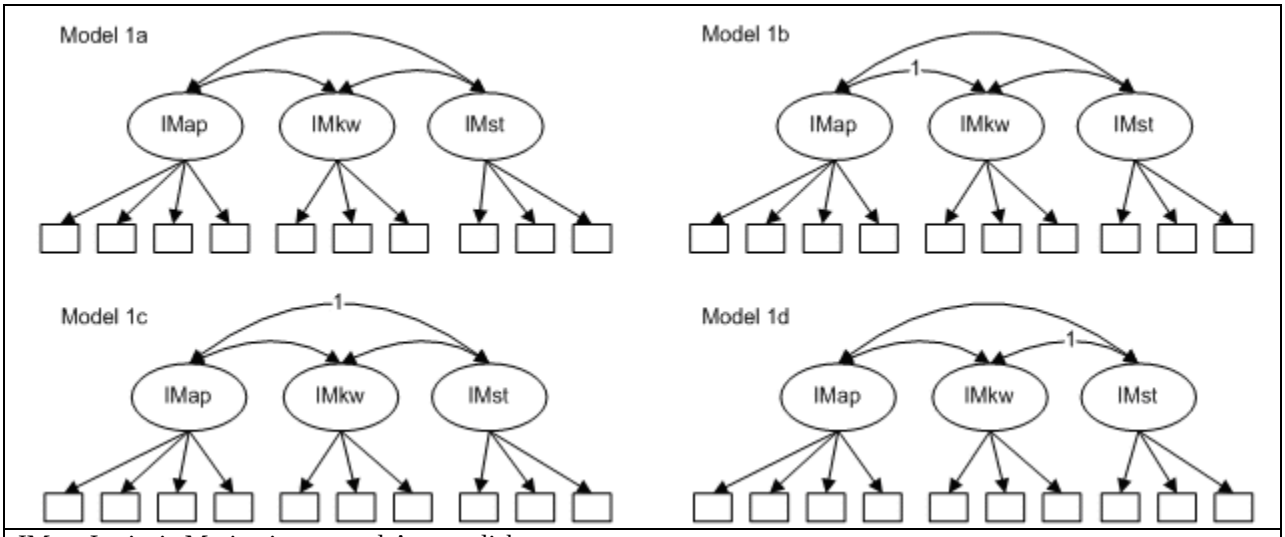
IMap: Intrinsic Motivation toward Accomplishment
IMkw: Intrinsic Motivation to Know
IMst: Intrinsic Motivation to Experience Stimulation

Figure 3. Nomological Net of RIM



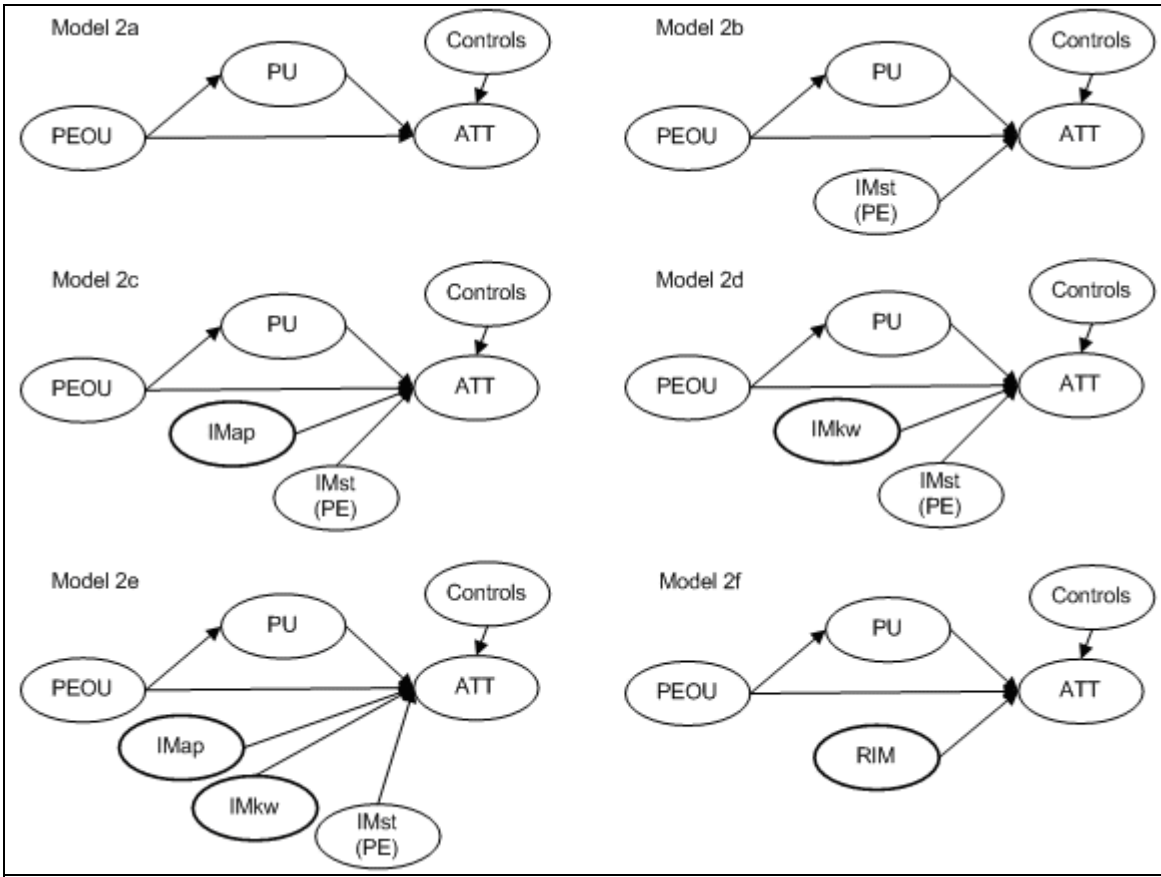
ATT: user attitude
PEOU: perceived ease of use
PU: perceived usefulness
RIM: the second-order, formative rich intrinsic motivation construct

Figure 2. Validating RIM by Covariance-Based SEM



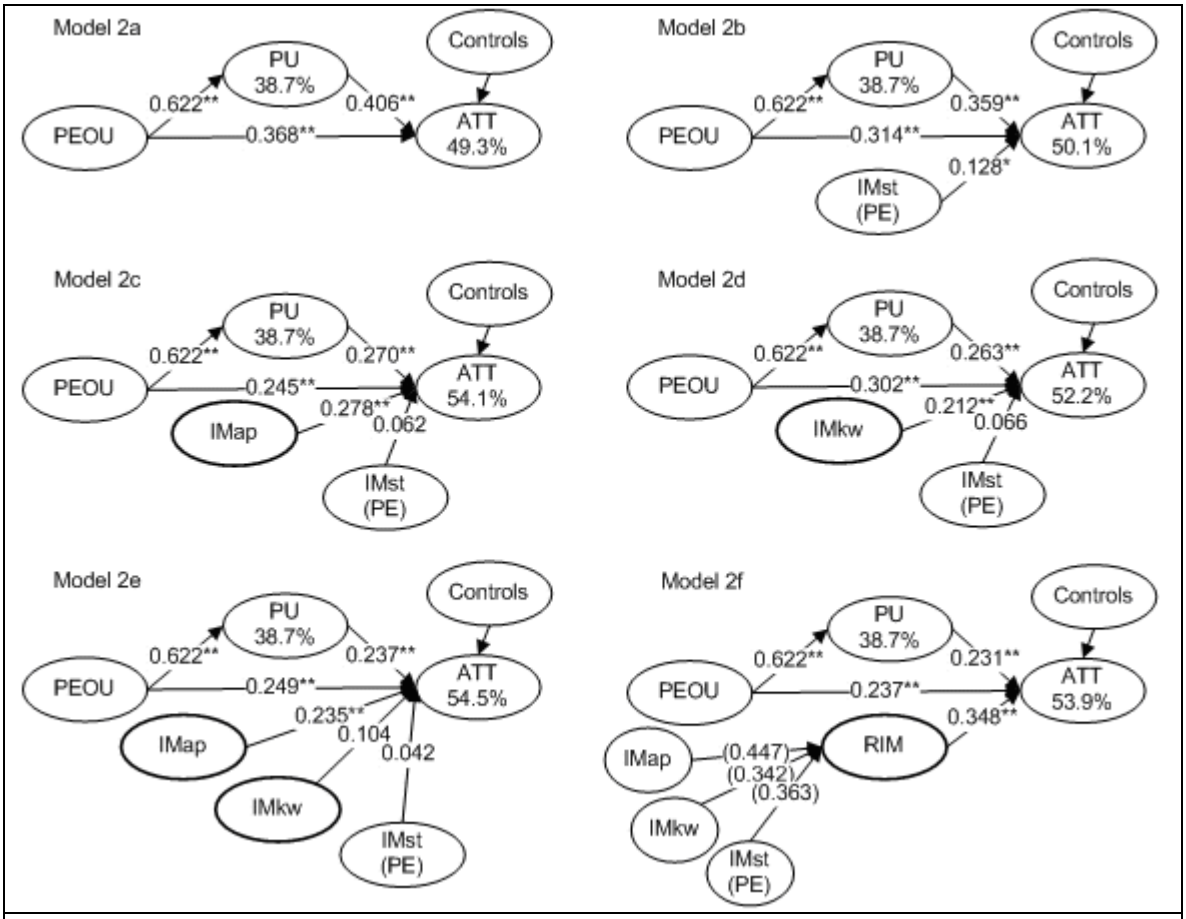
IMap: Intrinsic Motivation toward Accomplishment
IMkw: Intrinsic Motivation to Know
IMst: Intrinsic Motivation to Experience Stimulation

Figure 4. Structural Models



ATT: user attitude
Controls: age, education, gender, use experience, work experience
IMap: Intrinsic Motivation toward Accomplishment
IMkw: Intrinsic Motivation to Know
IMst: Intrinsic Motivation to Experience Stimulation
PEOU: perceived ease of use
PU: perceived usefulness
RIM: the second-order, formative rich intrinsic motivation construct

Figure 5. PLS Results of Structural Models



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Controls: age, education, gender, use experience, work experience
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IMst: Intrinsic Motivation to Experience Stimulation
PEOU: perceived ease of use
PU: perceived usefulness
RIM: the second-order, formative rich intrinsic motivation construct