EXPLORING CONTINUOUS PARTICIPATION ON ENTERTAINMENT APPLICATIONS OF SOCIAL NETWORK SITES

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Abstract

Researchers have been increasingly interested in examining the effect of social network site based entertainment applications (SNSEA) in retaining while expanding user base for the websites. This paper therefore proposed a research model that investigates how the different types of information embedded on SNSEA affect such continuous participation according to elaboration-likelihood model. The empirical study shows that (1) symbolic physicality reflects the content information of SNSEA, highlighting the cognitive belief (i.e., perceived curiosity) that users can obtain from SNSEA; (2) inherent sociability captures the circumstance or environment cue information of SNSEA, highlighting the affective reaction (i.e., perceived enjoyment); (3) perceived enjoyment, which is significantly related to perceived curiosity of SNSEA, is the significant antecedent of user’s continuous participation. In terms of practical implication, our study provides significant indications on how to design and manage SNSEA in an effort to increase user base.

Keywords: Symbolic Physicality, Inherent Sociability, Perceived Curiosity, Perceived Enjoyment, Continuous Participation, Elaboration-likelihood Model.
1 INTRODUCTION

Social network sites (SNS) refer to web-based services that allow users to set up contacts with others by visiting each other’s personal profile to maintain social connections (Boyd 2008). SNS as a novel technology of social media has been attracting more and more users in recent years. Popular social network sites include Facebook, MySpace and LinkedIn etc., which have attracted millions of registered users and maintained strong growth every year. As a result, how customers can be well-retained became the top priority for SNS (Bhattacherjee 2001; Venkatesh 2000), due to the proliferation of newcomers in the industry. It is common to notice that a single user may have several accounts with different SNS. In this case, users prefer visiting the latest launched SNS more often in comparison to their visits to older ones (Boyd 2008). Therefore, how SNS survive in such fierce competition have been top concerns for both SNS managers and academic researchers recently.

To this end, the pervasive use of entertainment applications such as Farmville in Facebook, Farm Town in MySpace, can be commonly seen in SNS. Such social network sites entertainment applications (SNSEA) has been potentially considered as an effective approach to provide extensive customer base for SNS. SNSEA refer to game applications for the purpose of socializing on SNS, attracting millions of users per month (Boyd 2008). Therefore, researchers and practitioners have been increasingly interested in examining SNSEA as they provide an effective mechanism for SNS to retain and expand their user base.

However, research on how SNSEA can be well designed and utilized is still scant in current literature. To this end, we argue that Elaboration-Likelihood Model (ELM) can enhance our understanding toward what types of information will be useful in attracting users’ continuous participation on SNSEA. The ELM classifies influence mechanisms or routes into central and peripheral types based on the types of information processed by a given user, explaining circumstance under what user may be more influenced by one route than another, and discussing the long-term effects of each influence route (Pretty and Cacioppo 1986). Based on interaction design of social playfulness in SNSEA, two types of characteristics information about SNSEA (i.e., symbolic physicality and inherent sociability) are identified from the perspective of central and peripheral routes of ELM respectively. Symbolic physicality, i.e., the extent to which SNSEA includes real world elements, and affords to reproduce the physical actions or activities( Wu et al. 2010), is the main characteristic of game content in SNSEA and makes the users familiar with the applications themes and effortless to participate in; whereas inherent sociability, i.e., the extent to which SNSEA facilitates interactions and communications among users, improves the social context for users, and facilitates the social interaction(Wu et al. 2010), is the circumstance of playing SNSEA and makes the players social-connected. Satisfying player’s entertainment requirement and socialization need is critical for the playfulness of SNSEA (Järvinen 2009; Rao 2008). And both symbolic physicality and inherent sociability are significantly important antecedents of user’s playfulness (Wu et al. 2010).

The present study thus aims at understanding how the two types of information on SNSEA affect user’s continuous participation from the perspective of ELM. Two major issues are investigated in this study:

The two influencing processes of information. This study characterizes influencing processes of information in SNSEA by the degree to which they provide central route (i.e., symbolic physicality) and peripheral route (i.e., inherent sociability). The prime objective of this research is to test whether or not the two influencing processes of information affect user’s perceptions of using SNSEA and if so, to what extent.

The factors that determine user’s continuous participation toward SNSEA. Anchoring on the ELM (Pretty and Cacioppo 1986), we specified a cognition-affectation-intention frame of changed attitude in ELM, and investigated that perceived curiosity as cognitive belief and perceived enjoyment as affective reaction are influential in an user’s continuous participation of SNSEA.

The rest of the paper is structured as follows. First, we discussed the current perspectives on ELM in order to establish our theoretical background. Second, the research methodology and data collection will
be stated. We will close with a discussion on the research results as well as theoretical and practical implications.

2 THEORETICAL BACKGROUND

2.1 Elaboration Likelihood Model

The role of influencing processes from different types of information in shaping human perceptions and behavior has been examined based on dual-process theories in the social psychology literature (Bhattacharjee and Sanford 2001). Elaboration-likelihood model (ELM), one of the dual process theories, has been chosen to investigate the information influence on attracting users in this study for several reasons. First, ELM relates directly to human perceptions and behavior in terms of information-influencing process. Second, ELM classifies influencing mechanisms or routes of individual attitude change into central and peripheral types based on the types of information processed by a given user (e.g., task-relevant arguments or simple cues) (Bhattacharjee and Sanford 2006; Pretty and Cacioppo 1986).

Specifically, the central route requires a person to consider critically about issue-related arguments or information prior to forming an informed judgment about the target behavior; while the peripheral route involves less cognitive effort, where subjects rely on the cues regarding to the target behavior, rather than the quality of object to form an attitude (Bhattacharjee and Sanford 2006). Bhattacharjee and Sanford (2006) presented that central and peripheral routes are distinct in three ways. First, the central route process issue-related arguments or information, while the peripheral route processes relevant circumstances or environment. Second, the cognitive effort involved in information processing is much higher in the central route than in the peripheral one. Last, perception changes induced via the central route are generally more stable, more enduring, and more predictive of long-term behaviors since they are based on deliberate and thoughtful consideration of relevant arguments (Pretty and Cacioppo 1986).

Comparing to prior theories of IT acceptance such as TAM and IDT, ELM has been claimed advantages in IT adoption: (1) its focus on the processes by which user perceptions are formed and (2) its contextualized nature, which can explain not only how influence effects vary across individuals but also how such variation may occur within individuals (Bhattacharjee and Sanford 2006). Moreover, ELM has enjoyed a tradition of empirical research in information systems (e.g., Bhattacharjee and Sanford 2006; Dijkstra 1999; Mak et al. 1997; Sussman and Siegel 2003). However, majority of them are focused on initial adoption, neglecting the importance of post adoption. This study aims to employ ELM to explain the nature and impacts of different influencing processes of information on user’s continuous participation in the context of SNSEA, which refer to a post-adoption phenomenon.

2.2 Symbolic Physicality and Inherent Sociability

Järvinen (2009) defined the design of SNSEA as interaction design of social playfulness. In other words, playfulness of SNSEA is the domain antecedent of playing. Playfulness has been perceived as the motivational characteristics of individual to influence computer usage (Martocchio and Webster 1992; Webster and Martocchio 1992), and use of WWW (Atkinson and Kydd 1992; Moon and Kim 2001). Playfulness is believed to influence user’s behavior of SNSEA while both Rao (2008) and Järvinen (2009) have studied the playful dispositions of SNSEA. Moreover, SNSEA has been viewed as both individual entertainment purpose and socialization tool. For applications development in SNS, therefore, it is necessary to include practices of game design and practices of interaction design. In addition, Järvinen (2009) argued that design for playfulness implies that the focus of design result should privilege emotional engagement rather than highly intricate and innovative gameplay.

Social playfulness in virtual “third places” can be determined by three main qualities of the applications: physicality, spontaneity, and sociability (Rao 2008). In the context of networked play, spontaneity is closely related to both accessibility and familiarity with the applications. According to Järvinen (2009),
spontaneity allows applications to model acts and themes familiar from everyday life or popular culture, eliminating the need to explain various rules, as players are familiar with the conventions and behavioral schemas; and spontaneity is beneficial from symbolic physicality. Therefore it is reasonable to conclude that spontaneity is consequence of symbolic physicality. Inherent sociability is the other prominent characteristic of SNSEA, which contributes to user’s playfulness as well (Jäätinen 2009). The social aspects of playing are important for the players and possess an effect on the gameplay (Stenros et al. 2009). Therefore, this study aims to explore the effect of symbolic physicality and inherent sociability on SNSEA by relying on the concepts of central and peripheral routes of ELM.

In applying ELM, we first identify the two routes according to interaction design of social playfulness of SNSEA. Symbolic physicality can be characterized under the concept of central route that concerns about the issue-related information, based on the fact that symbolic physicality is inherent characteristic of SNSEA contents. Meanwhile, inherent sociability describes the circumstance or environment under what SNSEA is employed, responding to issue-related cues; thus it is logically appropriate to treat inherent sociability as peripheral route of attitude changes in ELM.

2.3 Perceived Curiosity and Perceived Enjoyment

To study user’s cognitive belief, affective reaction and behavior intention, it is reasonable to expand dependent variable “changed attitude” in ELM. This is justifiable since social psychology research views attitude as a broad construct consisting of three related components: cognition, affection, and conation (Breckler 1984). This expansion is further consistent with “belief-attitude-intention” framework of extant TRA (Ajzen 1991). In IT context, the conation dimension refers to intentions or behavioral dimension dispositions regarding with IT acceptance (Bhattacherjee and Sanford 2006). Cognitive belief refers to the mental processes occurring in an individual’s mind when he or she interacts with stimulus (Eroglu et al. 2001). In the IS literature, perceived curiosity (Koo 2009) which fall into the category of cognitive belief, poses significant implications toward the area of IT acceptance. In the context of SNSEA, perceived curiosity refers to the extent to which the activity of playing SNSEA is perceived to provide learning experience about new things, strategies, and trends (Koo 2009). In contrast, affective reactions capture an individual’s emotional response when interacting with an environment (Sun and P. Zhang 2006). Perceived enjoyment has been found to be a robust and well-established construct for capturing the affective reaction to an environment (Koufaris 2002). In this context, Perceived enjoyment refers to the extent to which participation in SNSEA is perceived to be pleasurable, exciting, enjoyable and fun.

Further, the identified cognitive belief (i.e., perceived curiosity) and affective reaction (i.e., perceived enjoyment) are consistent with playfulness of SNSEA. On the basis of the Csiksentimihalyi’s (1975) and Deci’s (1975) works, Moon and Kim (2001) defined three dimensions of perceived playfulness: concentration, curiosity, and enjoyment. However, it is not necessary to include all them in practice of a single phenomenon (Moon and Kim 2001). Koo’s (2009) and Koufaris’s (2002) works both have consistently suggested that concentration was not a significant predictor of online user’s intention while enjoyment was. Moreover, from a multi-motivation perspective, it is theoretically suggested perceived curiosity to be an important antecedent of online game playing (Koo 2009; Wood et al. 2004). With the above consideration, perceived curiosity and enjoyment are adopted to be potentially significant dimensions of playfulness in this study.

3 RESEARCH MODEL AND HYPOTHESES

Based on the above mentioned variable justifications, our research model aims to investigate the different characteristics of information on SNSEA (i.e. symbolic physicality and inherent sociability) affecting the factors (i.e. perceived curiosity and perceived enjoyment) that lead to user’s continuous participation of
SNSEA. In this context, continuous participation is defined as the degree of users’ willingness to return to and prolong their duration of each stay in SNSEA (Koo 2009; Wu et al. 2008).

![Diagram of research model]

**Figure 1. Research Model**

ELM suggests central and peripheral routes are directly related to attitude and belief change (Bhattacherjee and Sanford 2006). We have expanded “attitude change” into a framework of “belief-attitude-intention”, and intention is presented to be influenced by belief or attitude, according to TAM (Davis et al. 1989) and TRA(Ajzen and Fishbein 1980). Then, central and peripheral routes indirectly influence user’s intention that can be determined through cognitive belief and affective reaction.

The virtual worlds that users routinely plug in and inhabit today are persistent social and material worlds; and virtual environments have the potential to function as new third places similar to pubs, coffee shops, and other hangouts by providing the spaces for social interaction and relationships beyond the workplace and home (Steinkuehler and Williams 2006). Meanwhile, the combination of game reality and physical reality presents a novel design for pervasive games (Lankoski et al. 2004). Applications, which include richness of physical elements, could arouse players’ interests, and make them curious to check whether there are differences between the online and offline application themes. At the same time, perceived curiosity is a sub-dimension of playfulness, which is empirically believed to be determined by symbolic physicality. Thus, the following hypothesis is given:

**H1: The degree of symbolic physicality of SNSEA is positively related to users’ perceived curiosity.**

Based on ELM, central route is reported to influence user’s affective reaction within attitude change. Herein, we manipulated affective reaction as perceived enjoyment. Perceived enjoyment is a widely studied concept of affection (e.g., Jiang and Benbasat 2007; Parboteeah et al. 2009). SNSEA with symbolic physicality could make users enjoyable as it provides the similar feelings for users just as what they can get in their daily life. Real-life activities such as drinking beer, poking, hugging etc, can be added into SNSEA in order to embed physical depth to playful interactions and make the user have a sense of “human warmth” of actual physicality to the non-physical online spaces. Moreover, perceived enjoyment is a sub-dimension of playfulness, which is empirically believed to be determined by symbolic physicality (Lankoski et al. 2004). Then, the following hypothesis is proposed:

**H2: The degree of symbolic physicality of SNSEA is positively related to users’ perceived enjoyment.**

Implicit forms of sociability in single-player-games played in SNS are considered as one of the salient characteristics deeply associated with SNS (Stenros et al. 2009). Playfulness is intrinsically connected to social situations (Rao 2008). Playfulness arising from social situations creates the best conditions for the individuals to communicate in a group, allowing people to “express personal meanings in social structures”(Parker-Ree 1999). SNSEA provides a framework for alliances, game-play and motivation, relying on social context, where the individuals know each other (Järven 2009). As one of the two functionalities of SNSEA, socialization can be realized from the inherent sociability characteristics of information on SNSEA.

According to ELM, individual’s cognitive belief is related with peripheral cues of the subject; and inherent sociability captures the environment or cue about SNSEA, imposing users with peripheral
information of the SNSEA. What’s more, inherent sociability, as one aspect information of playful disposition, is reported to impact on playfulness of application. Herein, the following hypothesis is presented:

*H3: The degree of inherent sociability of SNSEA is positively related to users’ perceived curiosity.*

Peripheral cues are likely to influence attitude because such cues appeal to human affect rather than their rational judgment (Bhattacharjee and Sanford 2006), such as inherent sociability in this context. Inherent sociability of SNSEA could facilitate the interaction between users, and enhance the communication; then, such interaction or communication definitely increases users’ enjoyment during the playing. Thus, the following hypothesis is reported:

*H4: The degree of inherent sociability of SNSEA is positively related to users’ perceived enjoyment.*

The interplay between cognition and affect has been studied extensively. It has been proposed that cognition determines affect, which ultimately influences behavior (Holbrook and Batra 1987). Affective reaction is experienced only after cognitive belief to the environment has been completed; and the cognitive reaction to the environment can thus have an enhancing or a deterring effect on the affective reaction experienced and would be considered as an antecedent to emotional reaction (Parboteeah et al. 2009). Then the following hypothesis is elaborated:

*H5: user’s perceived enjoyment of SNSEA is positively related to perceived curiosity.*

Again, according to “belief-attitude-intention” framework, the affective reaction to the interaction will determine an individual’s response (Mehrabian and Russell 1974), which, in this study, is continuous participation of SNSEA. Perceived enjoyment has been clarified to be an important antecedent of online games playing or online purchase in several previous studies (Hsu and Lu 2004; Koo 2009; Koufaris 2002). Thus, the following hypothesis is described:

*H6: user’s continuous participation of SNSEA is positively related to perceived enjoyment.*
4 METHODOLOGY

The definitions and operationalizations of identified constructs were either self-developed or based on relevant literature with revisions to fit this research. All of the measurements were subjected to a two-stage conceptual validation exercise based on procedures prescribed by (Moore and Benbasat 1991). All items have an acceptable level of agreement among sorters (>0.9). The items are described in Appendix.

In order to test our proposed hypotheses, we applied survey methodology in our empirical study. As proposed by methodologists Anderson and Gerbing (Anderson and Gerbing 1988), survey was followed by rigorous psychometric analysis. Respondents were invited to represent their agreements with a given statement on a seven-point Likert scale ranging from “1: strongly disagree” to “7: strongly agree” with the midpoint anchored as “neither agree nor disagree”. A paper-based survey, which was administered within a popular Chinese SNS with more than 80 million users, had been carried out to gain user-reported data in a famous Chinese university. Notifications to participations of this survey were sent out via intranet emails to all students within the university, mentioning the venues and time of holding as well as the award of 10 RMB for each participant with a 10-percent possibility of winning 50 RMB as extra bonus. Our survey was conducted on first-come first-serve basis, which means that each student can come in to our lecture room and start to fill in the questionnaire immediately. The total duration of our data collection was 4 hours.

For the main study, the survey yielded 133 usable responses, except 2 uncompleted questionnaires, which in total yields an acceptable sample size in line with similar studies. 75.2 percent of the respondents were female while 24.8 were male. The majority of respondents (82.7) were between 18 and 22 years old. Most of them are sophomore, junior or senior in the university with a weighting rate of 30.1%, 25.6% and 35.3% respectively. 21.1% of them have 2–4 years experiences in Internet using, 44.4% for 5–7 years, and 25.6% for 8–10 years. Finally, 27.1% respondents have a 1–2 years experience of SNS, 41.4 of 2–3 years, and 27.8 years of 3–4 years.

Our survey was initially developed in English and subsequently translated into Chinese to fit with our subjects’ native language. Later, a backward translation was performed to minimize the bias in two different versions. Necessary modifications were made accordingly after comparison. Partial Last Squares (PLS) for the investigation of measurement and structural models was conducted by using Smart PLS 2.0 (Ringle et al. 2005) after the data collection. PLS is a robust and frequently adopted technique in IS literature. PLS is a component-based structural equation modeling approach, requiring relatively small sample size and no restriction on normal distribution (Chin et al. 2003). Therefore it is highly suitable to use PLS for data analysis of our study. Two-step analytical procedures (i.e., measurement model, and structural model) are followed (Hair et al. 1995).

5 RESULT

5.1 Measurement Model

Assessments of measurement model has been performed to examine individual item reliability, internal consistency, and discriminant validity (Barclay et al. 1995). After checking the item-factor loadings, items SP4, IS2, IS3, and PE4 are dropped with loadings less than 0.6(Barclay et al. 1995; Chin 1998). The left measurements in the present study generally load heavily on their respective constructs (see Table 1), with loadings almost or nearly above 0.7; thus we confirm the measurements demonstrate adequate reliability. To measure internal consistency, Composite reliability (CR) and Cronbach’s alpha (α), are required to be greater than 0.7 (Hair et al. 1995). AVE, CR and α scores are presented in table 2.
Overall, internal consistency of the measurement scales is good. All $\alpha s$ are greater than 0.7 expect SP (i.e., 0.64) and CP (i.e., 0.63), which are both very close to the recommended cutoff. Similar to Cronbach’s $\alpha$, composite reliability (CR) is a measure of internal consistency. Unlike Cronbach’s $\alpha$, the composite reliability (CR) takes into account the actual loadings used to construct factor scores, and thus is a better measure of internal consistency. Discriminant validity was confirmed in our sample, because inter-construct correlations in Table 2 are less than square root of AVE (Fornell and Larcker 1981).

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Item</th>
<th>PC</th>
<th>PE</th>
<th>CP</th>
<th>IS</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbolic Physicality (SP)</td>
<td>SP1</td>
<td>.308</td>
<td>.231</td>
<td>.023</td>
<td>.379</td>
<td>.725</td>
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<tr>
<td></td>
<td>SP2</td>
<td>.275</td>
<td>.319</td>
<td>-.038</td>
<td>.287</td>
<td>.819</td>
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<tr>
<td></td>
<td>SP3</td>
<td>.249</td>
<td>.248</td>
<td>-.002</td>
<td>.236</td>
<td>.742</td>
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<tr>
<td>Inherent Sociability (IS)</td>
<td>IS1</td>
<td>.240</td>
<td>.413</td>
<td>.222</td>
<td>.823</td>
<td>.292</td>
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<tr>
<td></td>
<td>IS4</td>
<td>.246</td>
<td>.315</td>
<td>.168</td>
<td>.800</td>
<td>.310</td>
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<tr>
<td></td>
<td>IS5</td>
<td>.138</td>
<td>.256</td>
<td>.186</td>
<td>.745</td>
<td>.353</td>
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<tr>
<td>Perceived Curiosity (PC)</td>
<td>PC1</td>
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<td>.235</td>
<td>.118</td>
<td>.151</td>
<td>.270</td>
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<tr>
<td></td>
<td>PC2</td>
<td>.914</td>
<td>.384</td>
<td>.189</td>
<td>.240</td>
<td>.344</td>
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<td></td>
<td>PC3</td>
<td>.876</td>
<td>.407</td>
<td>.060</td>
<td>.259</td>
<td>.338</td>
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<tr>
<td></td>
<td>PC4</td>
<td>.822</td>
<td>.341</td>
<td>.115</td>
<td>.255</td>
<td>.250</td>
</tr>
<tr>
<td>Perceived Enjoyment (PE)</td>
<td>PE1</td>
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<td>.923</td>
<td>.312</td>
<td>.460</td>
<td>.171</td>
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<tr>
<td></td>
<td>PE2</td>
<td>.330</td>
<td>.882</td>
<td>.312</td>
<td>.320</td>
<td>.057</td>
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<tr>
<td></td>
<td>PE3</td>
<td>.378</td>
<td>.894</td>
<td>.297</td>
<td>.360</td>
<td>.229</td>
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<tr>
<td>Continuous Participation (CP)</td>
<td>CP2</td>
<td>.191</td>
<td>.242</td>
<td>.755</td>
<td>.257</td>
<td>.017</td>
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<tr>
<td></td>
<td>CP3</td>
<td>.129</td>
<td>.233</td>
<td>.827</td>
<td>.188</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>CP4</td>
<td>.019</td>
<td>.278</td>
<td>.657</td>
<td>.109</td>
<td>.033</td>
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Table 1. Loadings and Cross-Loadings of Measurement (After dropping)

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>S.D</th>
<th>AVE</th>
<th>CR</th>
<th>$\alpha$</th>
<th>PC</th>
<th>PE</th>
<th>SP</th>
<th>IS</th>
<th>CP</th>
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<tr>
<td>PC</td>
<td>4.07</td>
<td>1.17</td>
<td>0.69</td>
<td>0.90</td>
<td>0.85</td>
<td>0.83</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>PE</td>
<td>4.04</td>
<td>1.07</td>
<td>0.58</td>
<td>0.81</td>
<td>0.64</td>
<td>0.36</td>
<td>0.35</td>
<td>0.76</td>
<td></td>
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<tr>
<td>SP</td>
<td>4.92</td>
<td>1.00</td>
<td>0.62</td>
<td>0.83</td>
<td>0.70</td>
<td>0.27</td>
<td>0.43</td>
<td>0.39</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>IS</td>
<td>4.51</td>
<td>1.14</td>
<td>0.65</td>
<td>0.79</td>
<td>0.63</td>
<td>0.15</td>
<td>0.34</td>
<td>0.01</td>
<td>0.25</td>
<td>0.81</td>
</tr>
<tr>
<td>CP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 2. Internal Consistency and Discriminant Validity of Constructs

In summary, our measurement model confirmed the differences between all the relevance factors used; the internal consistency of the different aspects of the relevance factors is confirmed as manifested in different items. Therefore, we are now ready to test the structural model.

5.2 Structural Model

Bootstrap resampling was performed on the structural model to examine path significance levels. Figure 2 presents the results based on PLS analysis; all the judgments of significance are made at confidence level of 5 percents.

For user’s perceived curiosity ($R^2=0.153$), symbolic physicality is its significant predictor while inherent sociability is not its significant antecedent (i.e., $H1$ is supported, $H3$ is not supported). For user’s perceived enjoyment ($R^2=0.293$), inherent sociability is its significant antecedent while symbolic physicality appears to be insignificant; at the same time, user’s perceived curiosity appears to have a significant impact on user’s perceived enjoyment. Furthermore, perceived enjoyment ($R^2=0.145$) is the significant determinant of user’s continuous participation. We also tested for effects of control variables, which are the subjects’ demography (i.e., gender, age, grade, Internet experience, and SNS experience),
none of these variables was found to be significant (refer to table 3). Therefore, the hypotheses were robust across variation in the control variables.

As can be seen from the hypotheses testing results, H1 and H5 are supported while H2 is not. Referring to hypotheses foundation, we supposed that the relationship between symbolic physicality and perceived enjoyment is fully mediated by perceived curiosity. To check the mediation, method of four steps with multiple regressions is adopted (Frazier and Tix 2004). The relationship between symbolic physicality and perceived enjoyment is insignificant without mediator of perceived curiosity ($\beta=0.219$, $T$-value=1.919, $\alpha=0.05$). Based on the discussion above, it is reasonable to conclude that perceived curiosity does not mediate the relationship between symbolic physicality and perceived enjoyment. As H2 is not supported, perceived curiosity dose not mediated predictor inherent sociability and outcome perceived enjoyment yet.

![Diagram of hypotheses testing results]

**Note:** *,** represent significance at $\alpha=0.05$, and 0.01 respectively.

**Figure 2. Hypotheses testing results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T-value*</th>
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</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.034</td>
<td>0.191</td>
</tr>
<tr>
<td>Age</td>
<td>-0.039</td>
<td>0.636</td>
</tr>
<tr>
<td>Grade</td>
<td>0.158</td>
<td>0.1231</td>
</tr>
<tr>
<td>Internetexp</td>
<td>0.100</td>
<td>1.131</td>
</tr>
<tr>
<td>SNSexp</td>
<td>0.062</td>
<td>0.213</td>
</tr>
</tbody>
</table>

* represents significance at $\alpha=0.05$

**Table 3. Results of control variables testing**

Post-hoc analysis was performed to check the presence of common method variance, which is a potential threat to research using surveys that collect responses in a single setting. According to Harman’s (1967) test, the results of an un-rotated principal components factor analysis showed that the threat of common method variance is not evident in our study (the largest factor accounts for 28.28% percents of the variance explained, which is less than 50 percents).

### 6 DISCUSSION AND CONCLUSION

This study aims to identify how the different types of information embedded on SNSEA affects user’s continuous participation by borrowing the concepts of central and peripheral routes from ELM.

Noticeably, the change attitude of ELM has been extended into a cognition-affectio-intention framework. Of six hypotheses that were stated and validated using a survey methodology, four were significantly supported. In addition, mediation testing was carried out to identify the potential mediating
relationships among the constructs, giving no significant results found. Moreover, demographic 
information (i.e., gender, age, grade, Internet experience, SNS experience) was operationalized as control 
variables to check the influence, showing no significant findings.

As the empirical findings showed, user’s perceived curiosity is only significantly influenced by symbolic 
physicality, whereas perceived enjoyment is only significantly influenced by inherent sociability. 
Symbolic physicality, referring to central route, describes characteristic of SNSEA content, and provides 
the cognitive perceptions (i.e., perceived curiosity); at the same time, inherent sociability captures the 
circumstance or environment of SNSEA, and arouses user’s affective reaction (i.e., perceived 
enjoyment). In complementing prior research (e.g., Bhattacherjee and Sanford 2006), the empirical 
findings revealed that central and peripheral routes only significantly impacted on cognitive belief and 
affective reaction respectively in this research context. In the expansion of changed attitude of ELM, the 
significant relationships in the cognition-affection-intention framework were validated to be consistent 
with theory of reasoned action, which presents similar framework (Ajzen 1991). Perceived enjoyment, 
which is significantly related to user’s perceived curiosity of SNSEA, is the significant antecedent of 
user’s continuous participation of SNSEA. This finding is consistent with previous studies treating 
perceived enjoyment as a determinant of behavior (e.g., Koo 2009; Koufaris 2002).

The research has important indications for the post-IT adoption in IS research literatures, and sheds light 
on the interesting area of social media participation. In differing from prior researches that extensively 
employed the theories such as technology acceptance model (TAM) (Kim and Malhotra 2005; 
Vatansombut et al. 2008) and expectation-confirmation theory (Bhattacherjee 2001; Vatansombut et al. 
2008), this paper has successfully employed a novel theory, elaboration likelihood model, into the area of 
continuous participation of post-IT adoption. Although the ELM has been employed into the area of IT 
acceptance (Bhattacherjee and Sanford 2006; Dijkstra 1999; Mak et al. 1997; Sussman and Siegel 2003), 
majority of them focused on initial IT adoption and overlooked the area of post-IT adoption. Moreover, 
this study has extended dependent variable “changed attitude” of ELM into a cognition-affection-
intention framework and successfully validated its significance via an empirical study. The present study 
provides both theoretical and empirical support for the influence of cognition (e.g., perceived curiosity) 
on affection (e.g., perceived enjoyment). However, support has also been found for the influence of affect 
on cognition from previous studies (Venkatesh 2000). Future research should focus on elaborating 
relationships between affection and cognition to deepen expansion of “changed attitude”.

Given the growing popularity of SNSEA participation and the importance of such participation to the 
sustainability of SNS, this study provides significant practical implications for developers and managers 
of SNS. As switching cost of SNS is decreasing with the proliferation of SNS technology, the loyalty of 
users has been faced by most of SNS practitioners. Our study demonstrated that user’s continuous 
participation of SNSEA could be enhanced by increasing perceived enjoyment, which is directly 
influenced by inherent sociability, which means SNS practitioners should strive to serve users with 
SNSEA enabled high socialization opportunities, such as interaction, sharing resources, tagging, etc. 
Moreover, perceived enjoyment is empirically validated to be increased by enhanced perceived curiosity, 
and perceived curiosity is significantly impacted by symbolic physicality of SNSEA. This finding implies 
that SNSEA designers should focus on abstracting and incorporating physical elements from people’s 
daily life into the SNSEA, which can provide users with comfortable and familiar gaming environment 
that is easy to begin with.

However, our study is not without limitations. First, this study lacks theoretical and empirical 
considerations of the relationship between cognition (i.e., perceived curiosity) and intention (i.e., 
continuous participation) that has been considered quite often in prior researches (Davis et al. 1989; 
Venkatesh 2000; Venkatraman and Singh 2003). What’s more, the effect of affection (i.e., perceived 
enjoyment) on cognition (i.e., perceived curiosity) is not theoretically and empirically validated. Second, 
acceptance intention was used as a proxy for acceptance behavior. Objective data on continuance 
behavior was not available in our study since it is difficult to ask subjects to recall their accurate amount
of SNSEA playing in a specific period. Although we would have certainly preferred to include objective data on actual continuous behavior, we do not believe that doing so would have substantively changed any of our reported findings since the focus of this study was on understanding how the different types of characteristics information processed impact on user’s perceptions, not behaviors per se. Third, the majority of the targeted subjects in the sample pool are Chinese whereas our initial questionnaire was conducted in English. Although a backward translation was performed but there are still result bias that cannot be neglected. Next, it is difficult to generalize the findings to other entertainment technologies since this study only focuses on the context of SNSEA to examine the idiosyncratic antecedents of perceived curiosity and perceived enjoyment. Finally, based on limited prior research on SNSEA, we only investigated the symbolic physicality and inherent sociability of SNSEA. Future study could explore into other types of information embedded in SNSEA.

### Appendix

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symbolic Physicality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP1</td>
<td></td>
<td>SNSEA provide experiences of real-life activities</td>
<td>Adapted from Rao (2008), Järvinen (2009) and Self-developed</td>
</tr>
<tr>
<td>SP2</td>
<td></td>
<td>Themes of SNSEA come from daily lives</td>
<td></td>
</tr>
<tr>
<td>SP3</td>
<td></td>
<td>Conventions of SNSEA are the same as everyday life</td>
<td></td>
</tr>
<tr>
<td>SP4</td>
<td></td>
<td>Playing SNSEA requires much game experience (reversed)</td>
<td></td>
</tr>
<tr>
<td><strong>Inherent Sociability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS1</td>
<td></td>
<td>SNSEA support interaction with friends</td>
<td>Adapted from Rao (2008), Järvinen (2009) and Self-developed</td>
</tr>
<tr>
<td>IS2</td>
<td></td>
<td>Players’ real names can be seen from SNSEA</td>
<td></td>
</tr>
<tr>
<td>IS3</td>
<td></td>
<td>Player’s personal private information can be found in SNSEA</td>
<td></td>
</tr>
<tr>
<td>IS4</td>
<td></td>
<td>I feel stay connected with others when playing SNSEA</td>
<td></td>
</tr>
<tr>
<td>IS5</td>
<td></td>
<td>Playing SNSEA makes me feel friendly to others</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Curiosity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC1</td>
<td></td>
<td>Playing SNSEA makes me think</td>
<td>Adapted from Koo (2009) and self-developed</td>
</tr>
<tr>
<td>PC2</td>
<td></td>
<td>I consider that playing SNSEA is a learning experience</td>
<td></td>
</tr>
<tr>
<td>PC3</td>
<td></td>
<td>Playing SNSEA is a good method to learn what is new</td>
<td></td>
</tr>
<tr>
<td>PC4</td>
<td></td>
<td>I can learn from playing SNSEA</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Enjoyment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE1</td>
<td></td>
<td>It is fun to play SNSEA</td>
<td>Adapted from Koo (2009) and self-developed</td>
</tr>
<tr>
<td>PE2</td>
<td></td>
<td>It is interesting to play SNSEA</td>
<td></td>
</tr>
<tr>
<td>PE3</td>
<td></td>
<td>Playing SNSEA makes me enjoyable</td>
<td></td>
</tr>
<tr>
<td>PE4</td>
<td></td>
<td>I do not feel enjoyable, when playing the SNSEA (reversed)</td>
<td></td>
</tr>
<tr>
<td><strong>Continuous Participation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP1</td>
<td></td>
<td>I would play the SNSEA every time I visit the SNS</td>
<td>Adapted from Chang et al. (2008), Wu et al (2008) and self-developed</td>
</tr>
<tr>
<td>CP2</td>
<td></td>
<td>I would stay longer in the SNS for playing SNSEA</td>
<td></td>
</tr>
<tr>
<td>CP3</td>
<td></td>
<td>I would visit the SNS as often as I can for playing SNSEAS</td>
<td></td>
</tr>
<tr>
<td>CP4</td>
<td></td>
<td>I would like to discontinue play the SNSEA (reversed)</td>
<td></td>
</tr>
</tbody>
</table>
References


