EXPLORING THE INFLUENCE OF OPTIMUM STIMULATION LEVEL ON INDIVIDUAL PERCEPTIONS OF IT INNOVATIONS

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Abstract

Prior information systems (IS) research has established that individual perceptions of technologies determine their usage behavior, which is a prerequisite for the realization of business value of IT innovations. Hence, it is of critical importance to understand what factors shape individual perceptions of technologies. Perceived ease of use (PEOU) and perceived usefulness (PU) derived from TAM (technology acceptance model) have been consistently demonstrated to be two crucial factors impacting individual adoption and use of IT innovations. Moreover, the antecedents of PEOU and PU have received considerable research attention. Among the various antecedents, personal factors especially personality traits play a significant role but yet they have received limited attention. Considering that optimum stimulation level (OSL) as a general personality trait is closely related to the exploration and innovativeness in the adoption of IT innovations, this study builds on OSL theory and explores the impact of OSL on individuals’ PEOU and PU in the context of multi-homing use of social networking site (SNS) services. It was found that OSL has a significant impact on both PEOU and PU, whereby the impact is mediated by personal innovativeness in information technology (PIIT) and computer self-efficacy (CSE). Theoretical and practical implications that follow from the results as well as future directions are discussed.

Keywords: Optimum Stimulation Level Theory, Technology Acceptance Model, Social Networking Site, Personal Innovativeness in Information Technology, Computer Self-Efficacy.
1 INTRODUCTION

Understanding individual acceptance and use of IT innovations is an important and classic research topic in information systems (IS) research (Moore & Benbasat 1991; Venkatesh et al. 2003; Venkatesh et al. 2012) because the acceptance and use acts as the very first step toward the economic and business value realization of IT innovations. There have been several significant theoretical models, including theory of reasoned action (TRA), theory of planned behavior (TPB), technology acceptance model (TAM), and innovation diffusion theory (IDT), employed to explain individual acceptance and use in a wide variety of contexts. Although these theoretical models have distinct theorizations regarding the factors that affect IT adoption and use, they converge on the idea that individual perceptions are significant determinants of the acceptance and use of IT innovations (Davis 1989; Lewis et al. 2003).

Among the various perceptual variables, perceived ease of use (PEOU) and perceived usefulness (PU), the two core constructs in TAM (Davis 1989), have received extensive attention from IS researchers. Numerous studies have consistently demonstrated that PEOU and PU are crucial factors impacting individual acceptance and use (Adams et al. 1992; Agarwal & Karahanna 2000; Davis 1989; Hess et al. 2014; van der Heijden 2004; Venkatesh & Bala 2008; Venkatesh & Davis 2000; Wu & Lederer 2009). Despite the significant predictive power, PEOU and PU have been considered too abstract and thus cannot provide specific guidance for IT practitioners (Benbasat & Barki 2007; Straub & Burton-Jones 2007). In this regard, IS Scholars have called for a strong need to investigate what factors shape the development of PEOU and PU regarding IT innovations (Benbasat & Barki 2007; Lee et al. 2003; Venkatesh & Davis 1996).

Indeed, a number of researchers have answered the call and have made valuable contributions to our understanding of the antecedents of PEOU and PU. For instance, Agarwal and Prasad (1999) investigated the influence of individual differences. They found that training participation contributed to PU, and educational level and prior experience with similar technologies were positively associated with PEOU. Venkatesh (2000) focused on the determinants of PEOU from the anchoring and adjustment perspective. He found that aside from individual perceptions of external control regarding the technology and resource facilitating conditions, individual traits such as computer self-efficacy and computer anxiety had significant impacts on PEOU. While these studies have shed light on the understanding of a specific and limited set of antecedents, Lewis et al. (2003) proposed a systematic and comprehensive framework positing that PEOU and PU are developed within a milieu of three sources of influences, i.e., individual, social, and institutional factors. Of the three sets of factors, individual characteristics such as personality traits have the most proximate influence on individual perceptions (Lewis et al. 2003). Indeed, some researchers have demonstrated that personality traits such as the big-five personalities play a significant role in affecting PEOU and PU (Devaraj et al. 2008). Despite the critical importance, personality traits have received very limited attention in the IS literature (Devaraj et al. 2008; McElroy et al. 2007), and more research is needed to achieve a deeper understanding of the influence of personality factors. This study is concerned with one general personality trait which has been unexplored as an antecedent of PEOU and PU—optimum stimulation level (OSL).

OSL is a core concept in the OSL theory. It measures individual preference level of stimulation that is perceived as the most satisfying and pleasant (Raju 1980). Psychological research shows that individuals with different OSL exhibit differing levels of sensitivity to the same stimulus. In general, individuals with a relatively higher OSL have a stronger tendency to explore and are more likely to form positive perceptions of the unfamiliar and novel stimuli. Because many consumer behaviors such as adopting new products, services and brands possess an exploratory component, OSL has attracted a great deal of attention from marketing and consumer behavior researchers (Baumgartner & Steenkamp 1996; Steenkamp 2010; Steenkamp & Baumgartner 1992; Steenkamp & Burgess 2002). Numerous studies have revealed that unlike other general personality traits, OSL has considerable explanatory
power for consumer behaviors, especially those with an exploratory component (Joachimsthaler & Lastovicka 1984; Steenkamp 2010; Steenkamp & Baumgartner 1992). Although OSL has been extensively studied in the marketing literature (Steenkamp 2010), it has not yet been exploited by IS researchers to understand the effects on individual perceptions of IT innovations. In essence, individual acceptance and use of IT innovations is an exploring and learning process in which individuals explore and learn about IT innovations to form perceptions and make adoption decisions. According to the stimulus-organism-response (S-O-R) paradigm, IT innovations (e.g., social networking sites) and their components (e.g., website interactivity features, Jiang et al. 2010) and characteristics (e.g., website visual appeal, Parboteeah et al. 2009) can all be viewed as a stimulus. Thus, we propose that OSL plays an important role in affecting individual perceptions of IT innovations in terms of ease of use and usefulness. Therefore, the objective of this study is to delineate the effects of OSL on PEOU and PU and explore the impact mechanism.

This study makes three theoretical contributions. First, it theorized and modeled a causal chain between individuals’ traits, dynamic differences, and perceptions, which enriches and advances our understanding of the nomological net among individual differences that affect the adoption and use of IT innovations. Second, this study contributes to OSL theory by applying the theory to the IS domain and identifying the mediation effects of PIIT (personal innovativeness in information technology) and CSE (computer self-efficacy) on the impact of OSL on PEOU and PU. Third, this study contributes to IT adoption and use literature by introducing a general personality trait with considerable explanatory value—OSL as an antecedent of TAM constructs.

The remainder of this paper is organized as follows. In Section 2, we explicate the OSL theory and develop the research model and hypotheses. We describe the research method in Section 3 and report the data analysis results in Section 4. Section 5 provides the discussion of the research findings and the theoretical and practical implications, and presents the limitations and future research directions. Section 6 concludes this paper.

2 THEORETICAL FOUNDATION AND HYPOTHESES

This study draws on OSL theory and TAM literature to propose the hypotheses. Specifically, it was hypothesized that OSL has a positive effect on PEOU and PU, with the effect on PU mediated by IT domain-specific trait—PIIT and the effect on PEOU mediated by both PIIT and CSE. Figure 1 depicts the research model. Before developing the hypotheses, we first introduce the OSL theory.

![Research Model](Figure1)
2.1 Optimum Stimulation Level Theory

OSL theory is a psychological theory that posits that all individuals have the tendency to keep the stimulation obtained at the most pleasant level, which is referred to as OSL, and any departures from OSL will lead individuals to make attempts to adjust the stimulation, which is referred to as exploratory behavior (Hebb 1955; Leuba 1955; Raju 1980; Steenkamp & Baumgartner 1992). According to OSL theory, all stimulus situations have four attributes, namely, novelty, uncertainty, complexity, and conflict, in varying degrees. These attributes, combined with the perceived reward or punishment associated with the stimulus, creates the arousal potential, i.e., the stimulation level of the stimulus (Wahlers & Etzel 1985). OSL is a general personality trait that characterizes individuals’ general response to stimulation; it is stable in a certain individual but differs between individuals (Raju 1980; Steenkamp 2010; Steenkamp & Baumgartner 1992; Steenkamp & Burgess 2002).

Individuals with different OSL respond differently in terms of cognitions, perceptions, attitudes and behaviors to the same stimulus because of the differing sensitivity to stimulation. In general, those individuals with low OSL tend to stick to the status quo and feel comfortable with familiar stimuli and situations. In contrast, individuals with high OSL are likely to feel bored in stable and familiar environments and they have a greater tendency to explore new stimuli and situations to satisfy the stronger need for stimulation (Kish & Donnenwerth 1972; Raju 1980). Moreover, high-OSL individuals are more open to new experiences (Aluja et al. 2003; Vries et al. 2009) and are more bold and active in trying out new products, services, and brands (Raju 1980; Steenkamp & Burgess 2002). They are more innovative in using products and services (Mittelstaedt et al. 1976; Raju 1980) and enjoy exploring the new usage modes such as the alternative use of multiple products or services or brands of the same category (Menon & Kahn 1995).

2.2 Relating OSL to PEOU and PU

According to OSL theory, high-OSL individuals need a higher level of stimulation to feel comfortable and satisfied as compared with low-OSL individuals. They have a stronger desire to approach and explore activities and situations which are novel, changing, and complex (Kish & Donnenwerth 1972; Raju 1980). Consequently, when exposed to the same stimulus, high-OSL individuals are more likely to try and experience with the stimulus. They are more innovative and risk taking in the trying process. Therefore, in IT innovations context, high-OSL individuals are more likely to explore and learn about IT innovations (Mittelstaedt et al. 1976; Raju 1980). Because of a stronger need for stimulation, high-OSL individuals may not perceive as much difficulty as low-OSL individuals in the exploring and learning process; rather, they enjoy the exploration and learning and take the problems and difficulties encountered as great opportunities to increase the stimulus input (Berlyne 1960; Leuba 1955) so as to get best satisfied at the optimum level. In this regard, high-OSL individuals should perceive a higher level of ease of use regarding using IT innovations as compared with low-OSL individuals. Therefore, we hypothesize:

**H1: Individuals’ OSL positively influences PEOU regarding using IT innovations.**

As aforementioned, high-OSL individuals are more active in exploring and learning about IT innovations. Consequently, they create more opportunities to recognize the utilities and benefits deriving from using IT innovations. Prior research has suggested that OSL is positively associated with openness to experience (Aluja et al. 2003; Vries et al. 2009) and negatively relates to rigidity (Raju 1980). Since preference for variety, liberalism, and broad interests are the key definers of openness to experience (McCrae & Costa 1987), high-OSL individuals are more acceptant to IT innovations and their stimulating use. This innate inclusiveness and optimism facilitates the formation of positive perceptions such as usefulness of IT innovations. Furthermore, when faced with uncertain and risky activities, high-OSL individuals are predisposed to have an overall positive evaluations such
that the benefits deriving from engaging in the activities are perceived to be greater than the costs incurred (Maslowsky et al. 2011). In IT innovations context, therefore, high-OSL individuals are more likely to perceive the benefits regarding using IT innovations as compared with low-OSL individuals. Thus, we hypothesize:

**H2: Individuals’ OSL positively influences PU regarding using IT innovations.**

Since Davis (1989) proposed the TAM model, suggesting that PEOU is a possible antecedent to PU, a significant body of literature has empirically demonstrated that PEOU has a significant positive impact on PU across various contexts and domains (Agarwal & Prasad 1999; Devaraj et al. 2008; Karahanna & Straub 1999; King & He 2006; Saadé & Bahli 2005; van der Heijden 2004; Venkatesh & Davis 2000). Therefore, we hypothesize:

**H3: Individuals’ PEOU positively influences PU regarding using IT innovations.**

### 2.3 Mediation Effects of PIIT

PIIT refers to individuals’ willingness to try out any new information technologies (Agarwal & Prasad 1998). It is a stable IT domain-specific trait that reflects individual explorativeness and innovativeness in accepting and using IT innovations (Agarwal & Prasad 1998; Thatcher & Perrewé 2002). OSL is a stable general personality trait that defines individuals’ general need for stimulation, which is determined by the novelty, uncertainty, and complexity of stimuli. It is apparent that OSL and PIIT both reflect individual explorativeness and innovativeness but at differential conceptual levels, with the former at the general and broad level (Steenkamp 2010) and the latter at the domain-specific level (Agarwal & Prasad 1998; Thatcher & Perrewé 2002). Therefore, in view of the conceptual relationship, OSL has a positive impact on PIIT.

OSL theory suggests that individuals with high OSL have a stronger desire to seek out and approach activities and situations that are novel, changing, and uncertain, and thus are more willing to try out new and unfamiliar things (Kish & Donnenwerth 1972). Applying the theorization to IT innovations context, it is reasonable to infer that high-OSL individuals’ stronger-than-average need for stimulation will be manifested in the way that they more strongly desire to experience and experiment with IT innovations and are more willing to be the initial adopters. That is, the higher individuals’ OSL, the higher the PIIT. In the conceptualization of PIIT, Agarwal and Prasad (1998) suggested that individuals with a higher level of PIIT tend to develop more positive perceptions and beliefs of IT innovations. Indeed, both Lewis et al. (2003) and Jackson et al. (2013) found empirical support for the significant positive impact of PIIT on individuals’ PEOU and PU. Therefore, based on the theoretical and conceptual analysis regarding OSL and PIIT, coupled with prior empirical findings, we posit that:

**H4a: PIIT mediates the effect of OSL on PEOU.**

**H4b: PIIT mediates the effect of OSL on PU.**

### 2.4 Mediation Effect of CSE on the PIIT-PEOU link

Lord et al. (1986) suggested that personality traits shape individual perceptions of their abilities. Bandura (1997) also suggested that personality traits affect individuals’ performance via the mediated effect of self-efficacy. OSL and PIIT are both personality traits that reflect individual explorativeness and innovativeness. Extant studies have suggested that PIIT significantly impacts CSE, which in turn significantly impacts PEOU, therefore, drawing upon prior scholars’ theorizations and empirical findings, we propose that the mediation effect of PIIT on the impact of OSL on PEOU is further mediated by CSE.
Individuals with high PIIT are early adopters of IT innovations (Agarwal & Prasad 1998). They are more active in exploring and experimenting with IT innovations, which creates more opportunities for them to try out, learn about, and master IT innovations (Agarwal et al. 2000). As a result, when facing computer-related technologies, individuals with high PIIT have more confidence in their ability to competently use the technologies, that is, individuals with higher PIIT tend to be higher in CSE. Indeed, the positive impact of PIIT on CSE has been empirically validated in Agarwal et al. (2000) and Thatcher and Perrewé (2002).

The effect of CSE on PEOU can be observed from their conceptual relationship (Davis 1989; Venkatesh & Davis 1996). CSE refers to individuals’ confidence in their ability to use computer technologies to accomplish specific computer-related tasks (Compeau & Higgins 1995). PEOU refers to the degree to which an individual believes that using a particular system would be free of effort (Davis 1989). Inferred from the conceptual definitions, individuals with higher CSE tend to have a higher level of confidence in using a particular system to accomplish tasks, and thus their beliefs regarding the ease of using the system are higher than the low-CSE individuals. Therefore, as we propose that PIIT mediates the impact of OSL on PEOU, we further hypothesize:

H5: CSE mediates the mediation effect of PIIT on the OSL-PEOU link.

3 RESEARCH METHOD

3.1 Research Context and Sample

To test the research model, we chose the multi-homing use of SNSs (social networking sites, the simultaneous use of multiple SNSs) as the research context for two reasons. First, as one of the most influential IT innovations in recent years, SNSs have attracted tremendous interests from scholars and practitioners (Agarwal et al. 2008; Aral et al. 2013; Kane et al. 2014). Because of the pervasive and significant impact of SNSs on individuals, organizations, and society, SNS research has been one of the most significant research topics (Agarwal et al. 2008; Aral et al. 2013; Kane et al. 2014). This study attempts to contribute to the SNS literature by exploring the impact of OSL on individual perceptions of SNS use. Second, SNSs have been widely adopted in recent years. The explorativeness and innovativeness of adopting a particular SNS has substantially decreased. Comparing to adopting a single SNS, the simultaneous use of multiple SNSs, which has been identified in several studies (Kisekka et al. 2013; Litt 2013), possesses a stronger exploratory and stimulating component because of a higher level of diversity and complexity in SNS choices (Jimenez-Martin & Ladrón-de-Guevara 2007; Steenkamp 2010). Because OSL and PIIT are both individual traits that reflect individual explorativeness and innovativeness, and prior research has suggested that OSL is associated with individual use of multiple products or services of the same category, this study chose the multi-homing use of SNSs over the adoption of a single SNS as the research context.

Because the research aim of this study is to validate the hypothesized relationships between individual traits and perceptions of IT innovations, we collected the survey data from 383 students at a large public university in China. 50.9% of the subjects were male and 49.1% were female. 46.7% were between 24-27 years old, followed by 37.6% who were between 19-23, and 15.7% who were above 27. Noticeably, a considerable proportion of the participants (85.6%) reported multi-homing use of SNSs.

1 The SNSs discussed in this paper refer to the open-to-all general SNSs, such as Facebook, Google+, Renren, and Tencent. Pengyou, which cater to diverse audiences and primarily serve the purpose of creating and maintaining relationships with offline known or unknown friends and family. The research does not include professionally-oriented (e.g., LinkedIn), dating-oriented (e.g., zhenai.com), shopping-oriented (e.g., mogujie.com), picture-sharing (e.g., Pinterest), or microblogging SNSs (e.g., Twitter).
3.2 Operationalization of Constructs

All constructs were measured using previously developed and rigorously validated scales with adaptation to the research context. Table 1 presents the measurement items and the sources. All items except for the items of computer self-efficacy were assessed with a 7-point Likert-type scale, ranging from “strongly disagree” to “strongly agree”. Following Compeau and Higgins (1995), computer self-efficacy was measured on a 10-point scale with 1 = not at all confident and 10 = totally confident.

Gender and prior experience with SNSs were included as control variables because they were suggested in prior literature to affect individuals’ PEOU and PU (Agarwal & Prasad 1999; Gefen & Straub 1997). Gender was coded as a binary variable, with males as 0 and females as 1. Prior experience with SNSs was measured by asking participants how many years they have used SNSs.

Because the original measures were English, we employed the back-translation method to ensure the consistency between the original English and the Chinese instruments (Craig & Douglas 2005). The preliminary questionnaire was examined by a panel of experts, consisting of three IS professors and six doctoral students, to assess the construct validity and wording ambiguity. Next, the questionnaire was pilot tested with 21 SNS users with at least half a year of SNS experience. Feedback obtained suggested no need to make substantial changes to the questionnaire. None of the pilot test participants was included in the data analysis reported in this study.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optimum stimulation level (OSL)</strong></td>
<td>OSL_1: I like to continue doing the same old things rather than trying new and different things.*</td>
<td>(Steenkamp &amp; Baumgartner 1995)</td>
</tr>
<tr>
<td></td>
<td>OSL_2: I like to experience novelty and change in my daily routine.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSL_3: I like a job that offers change, variety, and travel, even if it involves some danger.</td>
<td></td>
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<tr>
<td></td>
<td>OSL_4: I am continually seeking new ideas and experiences.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSL_5: I like continually changing activities.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSL_6: When things get boring, I like to find some new and unfamiliar experience.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSL_7: I prefer a routine way of life to an unpredictable one full of change.*</td>
<td></td>
</tr>
<tr>
<td><strong>Personal innovativeness in information technology (PIIT)</strong></td>
<td>PIIT_1: If I heard about a new information technology, I would look for ways to experiment with it.</td>
<td>(Agarwal &amp; Prasad 1998)</td>
</tr>
<tr>
<td></td>
<td>PIIT_2: Among my peers, I am usually the first to try out new information technologies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIIT_3: In general, I am hesitant to try out new information technologies.*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIIT_4: I like to experiment with new information technologies.</td>
<td></td>
</tr>
<tr>
<td><strong>Computer self-efficacy (CSE)</strong></td>
<td>CSE_1: if there was no one around to tell me what to do as I go.</td>
<td>(Compeau &amp; Higgins 1995)</td>
</tr>
<tr>
<td></td>
<td>CSE_2: if I had never used a package like it before.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_3: if I had only the software manuals for reference.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_4: if I had seen someone else using it before trying it myself.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_5: if I could call someone for help if I got stuck.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_6: if someone else had helped me get started.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_7: if I had a lot of time to complete the job for which the software was provided.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSE_8: if I had just the built-in help facility for assistance.</td>
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</tbody>
</table>
The psychometric properties of the scales were assessed prior to testing the hypotheses. Convergent and discriminant validity as well as the reliability of constructs were examined. Analysis results revealed that two reverse items measuring OSL (see Table 1) have loadings lower than 0.707. Thus, we dropped the two items for the following analyses.

Convergent validity was established by the AVE (average variance extracted) of constructs being greater than 0.5 (Fornell & Larcker 1981) and items loading on their intended constructs at 0.707 or above (Gefen et al. 2000; Nunnally & Bernstein 1994). Reliability of constructs—composite reliability and Cronbach’s α should be greater than the recommended threshold 0.7 (Nunnally & Bernstein 1994). For discriminant validity, the square root of the AVE for each construct should exceed the construct’s correlations with other constructs, and items should load higher on their intended constructs than on other constructs (Fornell & Larcker 1981; Gefen et al. 2000). Our analysis results suggested that all scales meet the requirements for psychometric properties. Table 2 shows the validity, reliability, and descriptive statistics of the constructs. It should be noted that due to space constraint, the item loadings and cross-loadings were not presented in this paper.

Table 1. Measurement items of constructs and sources

### 4.1 Measurement Model Evaluation

![Table 1](image)

<table>
<thead>
<tr>
<th></th>
<th>CSE_9</th>
<th>CSE_10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>if someone showed me how to do it first.</td>
<td>if I had used similar packages before this one to do the same job.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>PEOU_1</th>
<th>PEOU_2</th>
<th>PEOU_3</th>
<th>PEOU_4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived ease of use regarding multi-homing on SNSs (PEOU)</td>
<td>Learning to use multiple SNSs would be easy for me.</td>
<td>If I were to adopt multiple SNSs, it would be easy to use.</td>
<td>If I were to adopt multiple SNSs, it would be difficult to use.*</td>
<td>Using multiple SNSs does not require a lot of my mental effort.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>PU_1</th>
<th>PU_2</th>
<th>PU_3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness regarding multi-homing on SNSs (PU)</td>
<td>Using multiple SNSs will be of no benefit to me.*</td>
<td>Overall, using multiple SNSs will be advantageous.</td>
<td>I would find using multiple SNSs useful in my daily life.</td>
</tr>
</tbody>
</table>

Note: *: reverse items.

<table>
<thead>
<tr>
<th></th>
<th>CSE</th>
<th>OSL</th>
<th>PEOU</th>
<th>PIIT</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE</td>
<td>1.70</td>
<td>1.60</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Max</td>
<td>9.90</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
</tr>
<tr>
<td>M</td>
<td>7.42</td>
<td>4.95</td>
<td>5.44</td>
<td>4.40</td>
<td>4.40</td>
</tr>
<tr>
<td>SD</td>
<td>1.63</td>
<td>1.06</td>
<td>1.07</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>CR</td>
<td>0.95</td>
<td>0.92</td>
<td>0.92</td>
<td>0.90</td>
<td>0.90</td>
</tr>
<tr>
<td>Cronbach’s α</td>
<td>0.94</td>
<td>0.89</td>
<td>0.88</td>
<td>0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>AVE</td>
<td>0.67</td>
<td>0.69</td>
<td>0.74</td>
<td>0.69</td>
<td>0.69</td>
</tr>
<tr>
<td>CSE</td>
<td>0.82</td>
<td>0.83</td>
<td>0.34</td>
<td>0.38</td>
<td>0.24</td>
</tr>
<tr>
<td>OSL</td>
<td>0.83</td>
<td>0.83</td>
<td>0.14</td>
<td>0.42</td>
<td>0.83</td>
</tr>
<tr>
<td>PEOU</td>
<td>0.86</td>
<td>0.34</td>
<td>0.14</td>
<td>0.24</td>
<td>0.83</td>
</tr>
<tr>
<td>PIIT</td>
<td>0.86</td>
<td>0.34</td>
<td>0.14</td>
<td>0.24</td>
<td>0.83</td>
</tr>
<tr>
<td>PU</td>
<td>0.83</td>
<td>0.34</td>
<td>0.14</td>
<td>0.24</td>
<td>0.83</td>
</tr>
</tbody>
</table>
Table 2. Construct validity, reliability, and descriptive statistics

| PU  | 1.00 | 7.00 | 5.15 | 1.28 | 0.96 | 0.93 | 0.88 | 0.19 | 0.19 | 0.37 | 0.31 | 0.94 |

Note: M: mean, SD: standard deviation, CR: composite reliability; the bold diagonal elements are the square roots of AVEs of constructs.

4.2 Common Method Bias

Because all data collected was self-reported and from a single source (i.e., an individual SNS user), common method bias may be a threat to the internal validity of this study. To address this threat, we conducted two tests to determine the extent of the bias. First, as Podsakoff et al. (2003) recommended, we performed a Harman’s one factor test. The exploratory factor analysis results showed no emergence of a single factor nor a single factor accounting for a majority of the covariances in variables. Therefore, we consider that common method bias is not a serious concern in this study. Second, we adopted the technique developed by Liang et al. (2007) using PLS to assess the magnitude of common method bias. The average substantively explained variance of the indicators was 0.715, while the average method-based variance was 0.006. The ratio of substantive variance to method variance was about 119:1. Further, most method factor loadings were not significant. Based on the two test results, thus, we conclude that common method bias did not present a significant threat to this study.

4.3 Hypotheses Validation

In SmartPLS, bootstrapping method was used to assess the significance of the posited relationships. To test H1-H3, we included OSL, PEOU, and PU as well as the two control variables in a model. As depicted in Figure, OSL has a significant and positive impact on both PEOU and PU, providing support for H1 and H2, respectively. Consistent with prior research, PEOU significantly affects PU, thus, H3 was supported.

![Figure 2. Testing H1-H3](image)

Note: "n.s." insignificant at p<0.05, "*p<0.05, **p<0.01, †p<0.001, ‡p<0.0001.

To test the mediation effects of PIIT (H4a and H4b), we chose the bias-corrected (BC) bootstrapping method for two reasons. First, bootstrapping has been suggested a priori choice over the traditional methods such as the Sobel test and causal steps approach because it have higher statistical power while maintaining reasonable control over the Type I error rate (MacKinnon et al. 2002; MacKinnon et al. 2004; Preacher & Hayes 2008). Second, of the several bootstrapping methods, BC bootstrapping has been demonstrated to have the best overall performance in terms of accuracy and power (MacKinnon et al. 2004; Preacher & Hayes 2008). In our tests, we chose 5000 as the resampling times (Preacher & Hayes 2008).
To test H4a, a model was first constructed, in which OSL was the independent variable, PEOU was the dependent variable, gender and prior experience with SNSs were the covariates. Analysis results of the model showed that OSL has a significant and positive effect on PEOU (T=2.952, p<0.01). When introducing PIIT as the mediator, the direct effect of OSL on PEOU became insignificant (T=0.920), while the effect of OSL on PIIT and the effect of PIIT on PEOU were both significant and positive, suggesting that PIIT fully mediates the effect of OSL on PEOU. Furthermore, the point estimate of the mediation effect of PIIT from the original sample was 0.094, and the BC bootstrap 95% confidence interval was (0.032, 0.160), which did not include 0. Therefore, the mediation effect of PIIT on the OSL-PEOU link was significant, providing support for H4a. Similar procedures were performed to test H4b. The analysis results showed that PIIT fully mediates the effect of OSL on PU. The point estimate of the mediation effect from the original sample was 0.112, and the BC bootstrap 95% confidence interval was (0.062, 0.173), which did not include 0. Thus, H4b was supported.

To test the three-path mediation effect of PIIT and CSE on the impact of OSL on PEOU, as per Taylor et al.’s (2008) recommendation, we also used the BC bootstrapping method. A model (see Figure 3) was constructed and examined. As shown in Figure 3, the effects of OSL on PIIT, of PIIT on CSE, and of CSE on PEOU were all significant, while other paths between the three constructs were insignificant. The point estimate of the three-path mediation effect was 0.04, and the BC bootstrap 95% confidence interval (with 5000 resamples) was (0.020, 0.071), which did not include 0. Therefore, H5 was supported.

Figure 3. Testing the three-path mediation effect in H5

Post-hoc analysis. In the effect of OSL on PEOU, the mediation effect of PIIT (H4a) and the three-path mediation effect of PIIT and CSE (H5) were confirmed. These results raised a relevant question interesting us: does CSE mediate the effect of PIIT on PEOU? We believe that answering this question can help us gain deeper insights into the influence mechanism of OSL on PEOU. However, to our knowledge, the mediation effect of CSE on the PIIT-PEOU link has not yet been investigated in prior studies. Therefore, we conduct a post-hoc analysis on the mediation effect of CSE. Using the same method as for testing H4a, it was found that CSE fully mediates the effect of PIIT on PEOU. The point estimate of the mediation effect from the original sample was 0.105, and the BC bootstrap 95% confidence interval was (0.060, 0.158), suggesting the significant mediation effect of CSE.

5 DISCUSSIONS

5.1 Discussion of Findings

This study drew on OSL theory and TAM studies to explore the impact of OSL on individuals’ PEOU and PU in the context of multi-homing use of SNSs. The empirical results supported all our
hypotheses. Specifically, OSL was found to significantly affect both PEOU and PU. The findings are essentially consistent with OSL theory. Because of the need for a high level of stimulation, high-OSL individuals have a stronger desire to explore and experiment with IT innovations. They are more likely to respond positively to the problems and difficulties that are encountered in the trial process since problem solving provides a means of increasing the stimulus input (Berlyne 1960; Leuba 1955). Therefore, high-OSL individuals perceive a higher level of ease of use regarding using IT innovations. Moreover, individuals with high OSL are essentially more open to new experiences and more prone to seek variety and change in situations (Aluja et al. 2003; Vries et al. 2009). Therefore, they are more acceptable to IT innovations and their stimulating use such as the multi-homing use of SNSs. Coupled with the more active participation in the trial process, high-OSL individuals more likely recognize the benefits deriving from the use of IT innovations and thus perceive a higher level of usefulness.

PIIT was found to fully mediate the effects of OSL on PEOU and PU. The finding on the significant correlation between OSL and PIIT is consistent with Mahatanankoon (2007). However, contrary to Mahatanankoon’s (2007) viewpoint that PIIT has a positive influence on OSL, we argued that OSL precedes PIIT in the influence relationship. In this study, we held the view that OSL as a general personality trait exerts its influence on individual perceptions through the mediation effect of the domain-specific trait PIIT, not vice versa. To attest the view, we examined a path model, in which PIIT was the independent variable, OSL was the mediator, PEOU and PU were the dependent variables, and PIIT was also linked to PEOU and PU. The results revealed that the effects of OSL on PEOU and PU were both insignificant, indicating that OSL did not play the mediator role in the relationships with PIIT, PEOU, and PU. These findings provide empirical support for our proposition on the mediator role of PIIT.

CSE was found to mediate the mediation effect of PIIT on the effect of OSL on PEOU. This finding deeps and enhances our understanding of the influence mechanism of OSL on individual perceptions of IT innovations. According to OSL theory, high-OSL individuals are more active in exploring and experimenting with IT innovations because the novelty and uncertainty inherent in IT innovations fits the individuals’ strong need for stimulation. That is, the higher individuals’ OSL, the higher the PIIT. Prior studies have theoretically and empirically suggested that individuals with a higher level of PIIT are more confident in their ability to use computer technology to perform tasks (i.e., CSE) (Agarwal et al. 2000; Thatcher & Perrewé 2002), and individuals with a higher level of CSE perceive a higher level of ease of use of IT innovations (i.e., PEOU) (Agarwal et al. 2000; Venkatesh & Davis 1996), therefore, in light of the integration of OSL theory and IS research findings, the three-path mediation effect of PIIT and CSE on the effect of OSL on PEOU is in line with the expectation.

5.2 Theoretical Implications

This study makes theoretical contributions in three ways. First, this study theorized and modeled the relationships among individuals’ general personality traits (i.e., OSL), stable IT-domain specific traits (i.e., PIIT), dynamic IT-specific individual differences (i.e., CSE), and individual perceptions of IT innovations. The theorization and empirical testing of the research model enriches and advances our understanding of the nomological net among individual differences that affect the adoption and use of IT innovations. While prior scholars (e.g., Thatcher and Perrewé (2002)) have suggested that individuals’ dynamic IT-specific individual differences such as CSE are affected by both stable IT-domain specific traits and general traits, the relationship between the two sets of influencing factors, namely, stable IT-domain specific traits and general traits, have been understudied. Based on OSL theory and the conceptual relationship analysis, this study theorized a causal chain between individuals’ traits, dynamic differences, and perceptions, which provides a holistic view of the relationships among these constructs. In particular, this study have theoretically and empirically suggested that individuals’ general traits affect stable IT-domain specific traits and the effects of general traits on dynamic IT-specific individual differences are mediated by stable IT-domain traits.
Second, this study contributes to OSL theory by applying it to the IS domain to explore the influence mechanism of OSL on individual perceptions of IT innovations in terms of PEOU and PU. Extant studies based on OSL theory have been mostly in the marketing and consumer behavior field, the application of this theory in IS discipline is rare. This study extended the application scope of OSL theory into IS arena by integrating OSL theory and TAM constructs. Although OSL theory has theorized the effects of OSL on individual behaviors, the internal influence mechanism remains unclear. This study drew the concepts of PIIT and CSE from IT innovations literature to delineate the influence mechanism of OSL on PEOU and PU, which enriches and deepens our understanding of the influence process of OSL on individual behaviors.

Third, this study contributes to IT adoption and use literature by identifying the significant impact of a general personality trait (i.e., OSL) on PEOU and PU. Despite the significance in shaping individual perceptions and behaviors of IT innovations, personality traits have received limited attention in the IS literature (Devaraj et al. 2008; McElroy et al. 2007). More research is needed to incorporate personality variables to achieve a more comprehensive and deeper understanding in this area (Devaraj et al. 2008). This study provides new insights into personalities that affect individual acceptance and use of IT innovations. In comparison with prior similar studies (e.g., Nov & Ye 2008), OSL as a general personality trait has a comparable and even stronger explanatory power than domain-specific traits such as digital library-domain resistance to change in Nov and Ye (2008). The comparison result demonstrates the value of introducing OSL to investigate the impact of personality traits on individual perceptions of IT innovations.

5.3 Practical Implications

This study makes several practical implications. First, we found that individuals with high OSL perceive a higher level of PEOU and PU regarding using IT innovations. PEOU and PU have been demonstrated to be two crucial factors in determining individual acceptance and use of IT innovations. According to OSL theory, young well-educated employed males generally possess a higher level of OSL than the middle-aged undereducated housewives (Raju 1980). Therefore, our study provides guidance for the promotion and implementation of IT innovations in organizations and markets. Because young well-educated male employees perceive a higher level of PEOU and PU and thus are more likely to accept and try out IT innovations, companies should focus the limited resources on this demographic group to achieve a higher effectiveness and efficiency when promoting and implementing IT innovations. Besides, individual acceptance of IT innovations is also affected by social influence (Venkatesh & Davis 2000), companies can leverage the user group’s adoption to influence other users’ adoption decisions to cost-effectively achieve the market and organization goals.

Second, we attested the research model in the context of multi-homing use of SNSs. The research results can provide suggestions for SNS companies to devise the segmenting and marketing strategies. As aforementioned, young well-educated employed males generally have a higher level of OSL, which means that they are more likely to perceive a high level of ease of use and usefulness and thus are more likely to multi-home on SNSs. Therefore, SNS companies should place the marketing focus on young well-educated employed males when attracting prospective users from competitors. Because high-OSL individuals need a higher level of stimulus input such as novelty and uncertainty, it is more suitable for SNS companies to highlight the novelty and innovativeness of their SNS services in the user base developmental process. For instance, SNS companies can promote the innovativeness of their newly-developed website features and functionalities to stimulate users to visit their website, which creates the basis for users’ subsequent adoption of the website.

5.4 Limitations and Future Research

This study has some limitations that must be acknowledged. First, this study chose the multi-homing use of SNSs as the research context, difference exists in the adoption of a single vs. same-category
multiple IT innovations (Menon & Kahn 1995). Future research can test our research model in the single-IT innovation adoption context to validate our findings. Because of the rapid diffusion process in the networked and informationized society today, caution needs to be warranted to ensure the explorativeness and innovativeness of IT innovations remains at a reasonable level. Second, this study only included two TAM constructs, namely, PEOU and PU, and did not investigate the impact of OSL on individuals’ behavioral intention and actual behaviors. Prior studies have suggested that personality traits not only act as antecedents to individual perceptions but also play moderator roles in affecting individual adoption of IT innovations (Devaraj et al. 2008). Future research can incorporate the intention and behavior constructs to examine the moderating effect of OSL in individual acceptance and use. Third, aside from the mediator chain—PIIT and CSE identified in this study, there are other possible important mediators in the OSL-PEOU link. For instance, Agarwal et al. (2000) found that the effect of CSE on PEOU of a particular system was partially mediated by individuals’ system-specific self-efficacy, thus it is reasonable to infer that the mediator chain in the OSL-PEOU link may be extended by including individuals’ system-specific self-efficacy other than PIIT and CSE. We believe that future research investigating more potential mediators can enhance our understanding of the influence mechanism of OSL on individual perceptions and thus can provide more fruitful suggestions for intervening actions.

6 CONCLUSION

This study examined the impact of OSL on individuals’ PEOU and PU in the context of multi-homing use of SNSs. Analysis of the data collected from 383 SNS users demonstrated that OSL has a significant effect on PEOU and PU, and the effects are fully mediated by PIIT. Further, PIIT and CSE have a mediator chain effect on the impact of OSL on PEOU. Our findings enrich our understanding of personality effects in individual acceptance of IT innovations. This study also advances OSL theory by investigating the mediation effects of PIIT and CSE on the effect of OSL on individual perceptions. As OSL is a quite pertinent concept to IS discipline, we hope our study spurs more research investigating the effects of OSL on individual acceptance as well as other behaviors in IS contexts.

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