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Towards a Decomposed Expectation Confirmation Model of IT Continuance: The Role of Usability

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Abstract:

We propose a decomposed expectation confirmation model of IT continuance by 1) decomposing user expectation and confirmation into two dimensions of usefulness and usability, 2) conceptualizing the role of usability in IT continuance research, and 3) exploring changes in user perceptions of usability and usefulness over time and their impacts on user satisfaction and continuance intention. We tested the proposed research model using longitudinal data that we collected in two points in time six months apart from 125 users of the LinkedIn professional social networking site (pSNS). The results show that 1) perceived usability, usability confirmation, perceived usefulness, and usefulness confirmation determined user satisfaction with pSNS and 2) perceived usability along with satisfaction predicted continuance intention, whereas perceived usefulness had no effect. This study contributes IT continuance research by 1) proposing and empirically validating a decomposed model of IT continuance and 2) by bringing in usability as a core construct of interest for IT continuance research.

Keywords: IT Continuance, Expectation Confirmation Theory, Satisfaction, Usability, Social Networking Sites.

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1 Introduction

Confirmation of expectations (i.e., the extent to which users' initial expectations about using an IT are realized when they actually use it) is a focal concept in IT continuance research (e.g., Bhattacharjee 2001a; Bhattacharjee & Lin, 2015; Hsieh & Wang, 2007; Mäntymäki & Islam, 2014a). Drawing on the expectation confirmation theory (ECT) (Oliver, 1980, 1993), Bhattacharjee (2001a) developed the IT continuance model, which holds that perceived usefulness of the IT and user's satisfaction with the IT determine continuance intention. Both of these predictors, in turn, depend on the confirmation of expectations.

The IT continuance model (Bhattacharjee, 2001a; Bhattacharjee & Lin, 2015) and the referent ECT (Oliver 1980) view the confirmation of expectations in an aggregate manner. Since then, some studies (Venkatesh & Goyal, 2010; Terzis, Moridis, & Economides, 2013; Brown, Venkatesh, & Goyal, 2012, 2014) have disaggregated the overall confirmation construct into confirmation of expectations of usefulness, confirmation of ease of use, and confirmation of attitude. We argue that a disaggregate representation of confirmation with specific key expectations may be of greater help in guiding managers and system designers to focus on specific system attributes essential for maintaining the intention to continue using an IT. As Oliver (1980, p. 467) states, "disconfirmation ultimately takes place at the individual attribute level, suggesting that an attribute-specific measure may yield greater insight". In keeping with this suggestion, we decompose the confirmation construct at the attribute level into usefulness and usability confirmation in order to gain a better understanding of two key constituent dimensions of the confirmation construct and their relationship to subsequent continuance intentions.

We chose usefulness confirmation due to the argument that usefulness perceptions tend to have a long-term, enduring effect on continued intention to use IT, whereas perceived ease of use of a system has only a short-term effect that barely lasts beyond initial acceptance (Bhattacharjee, 2001a). However, an IT's design and aesthetics may still be salient in shaping usage decisions after the initial acceptance since people tend to favor using more user-friendly IT over less user-friendly systems (Overbeeke, Djajadiningrat, Hummels, & Wensveen, 2002) even when ease of use no longer bars people from using them. Hence, we investigate users' perceptions of IT design with usability (Chiu, Hsu, Sun, Lin, & Sun, 2005; Venkatesh & Ramesh 2006; Hoehle & Venkatesh, 2015) and argue that confirmation of usability expectations influences users' continuance decision. We argue that usability is an important extension to the IT continuance model (Bhattacharjee, 2001a) and a relevant contribution to the research on continued use of IT.

We test our decomposed expectation confirmation model in a professional social networking site (pSNS) context. pSNS such as LinkedIn, Xing, and Academia.edu focus on connecting with other professionals and sharing professional information, such as resumes, creative work (e.g., journal papers), and professional work (e.g., prior work-related projects), rather than on personal interests, such as political views or favorite books (Skeels & Grudin, 2009). Extending Boyd and Ellison's (2007) definition of SNS, we define pSNS as Web-based services that allow individuals to 1) construct a public or semi-public professional profile on an Internet website, 2) connect with other users on the website, and 3) share professionally oriented content such as news and articles with other users in the form of text, Web links, photographs, and video.

We chose pSNS as our research context due to the increasingly pervasive role social media plays in individuals' professional lives and the lack of prior research that focuses specifically on pSNS continuance (Appendix A). Since user demographics of pSNS differ from those of general SNS such as Facebook (Pew Internet Research, 2013), we extend the contextual coverage of SNS research towards services targeted at the professional audience.

We collected longitudinal data from 125 LinkedIn subscribers to a university alumni association and analyzed the data using the partial least squares (PLS) approach. Our key findings include: 1) decomposing confirmation offers fine-grained information about the determinants of satisfaction and continuance intention, 2) usability plays a more critical role in predicting satisfaction than usefulness, and 3) usability plays an important role in shaping continuance intention; however, satisfaction fully mediates the effect of usefulness on continuance intention.

The paper proceeds as follows: in Section 2, we present the theoretical background of the study and review the prior IT continuance literature. In Section 3, we describe our research model. In Section 4, we elaborate on our empirical research approach. In Section 5, we present our key findings and their implications for theory and practice. We also discuss the limitations of the present study and offer potential avenues for further research.

2 Research Background

2.1 Theoretical Underpinnings

IS research has widely used ECT to investigate continued or long-term use of IT products and services (Bhattacharjee, 2001a; Bhattacharjee & Premkumar, 2004; Chiu et al., 2005) and satisfaction (McKinney, Zoon, & Zahedi, 2002; Jiang, Klein, & Saunders, 2012). ECT suggests that consumers' satisfaction with a product or service determines their repurchase intention. In turn, two constructs determine consumer satisfaction: 1) initial expectations (pre-purchase expectations) about the product/service and 2) the discrepancies between the expectations and the actual performance of the product/service (confirmation). According to ECT, buyers first develop expectations about a product/service before purchase (at time t1). They may purchase the product/service if they have positive expectations about it. Following their purchase of the product/service, they assess its performance during its actual use (at time t2). The extent to which their realized performance meets, exceeds, or falls short of their initial expectations determines whether they confirm their pre-purchase expectations. Confirmation may be positive if actual performance exceeds the initial expectations, negative if performance falls short of expectations, and zero if expectations meets their expectations (Churchill & Surprenant, 1982). Positive confirmation results in satisfaction at time t2 that increases future repurchase intentions, while negative confirmation creates dissatisfaction that reduces or eliminates repurchase intentions. Figure 1 illustrates the relationships between these ECT constructs.

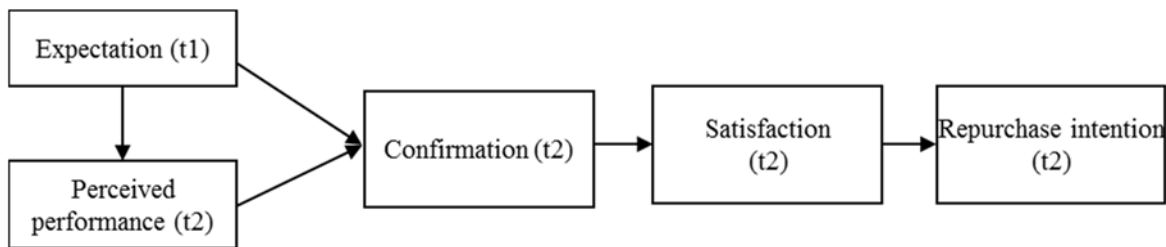


Figure 1. Expectation Confirmation Theory (Oliver, 1980)

Bhattacharjee (2001a) adapted ECT to investigate IT continuance. However, Bhattacharjee's (2001a) IT continuance model departs from the original ECT (Oliver, 1980, 1993) in two ways. First, it excludes initial expectation (at time t1) and perceived performance (at t2) since the user's perception of confirmation subsumes the net effect of those constructs. Second, it introduces expectation at time t2 as a new determinant of satisfaction and continuance intention distinct from that at time t1. Bhattacharjee's model presumes expectation at time t2 to be the outcome of confirmation and prior expectation (at t1). Furthermore, the model presumes this expectation to constitute perceived usefulness of the IT since research has shown utilitarian considerations to be one the primary considerations for both initial and long-term IT use (Bhattacharjee & Premkumar, 2004) and because users are unlikely to continue using a system if they do not find it beneficial or useful. However, perceived usefulness at t2 may differ from that at t1 because the user's confirmation experience between t1 and t2 shapes the latter (Bhattacharjee & Premkumar, 2004). For example, if users have high initial perceptions of usefulness and that expectation is negatively disconfirmed, they may lower their initial expectations to a more realistic level at a latter point of time. Conversely, if their initial expectation is low and positively disconfirmed, they may subsequently adjust their perceived usefulness to a higher level. Bhattacharjee (2001a) suggests that it is the perceived usefulness at t2 that subsumes and replaces perceived usefulness at t1 that serves as a new benchmark for their assessment of satisfaction with the IT and their intention to continue using the system. Figure 2 shows these relationships.

One advantage of Bhattacharjee's (2001a) model is that it does not require one to measure pre-adoption expectation since one measures all variables at time t2, which greatly simplifies empirical testing. However, it does not provide sufficient insight into the constituent dimensions of the confirmation construct (Bhattacharjee & Premkumar, 2004).

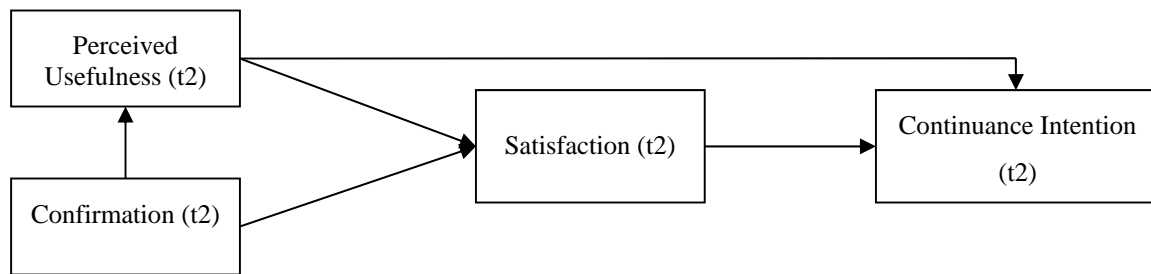


Figure 2. IT Continuance Model (Bhattacharjee, 2001a)

2.2 Prior IT continuance literature

Subsequent studies based on the IT continuance model have attempted to integrate it into other theories, such as the technology acceptance model (TAM) (Hong, Thong, & Tam, 2006), the theory of planned behavior (TPB) (Liao, Chen, & Yen, 2007; Liao, Palvia, & Chen, 2009; Kim, 2010), and the theory of network externalities (Mäntymäki & Islam, 2014), in order to investigate continuance in different contexts. Recently, Bhattacharjee and Lin (2015) put forward a unified model of IT continuance that integrates three theoretical perspectives (i.e., reasoned action, experiential response, and habitual response) into a single framework to explain their interrelationships. In Appendix A, we review the relevant literature published over the period from 2001 to 2015 and present their key findings.

As the appendix indicates, researchers have used a variety of variables, including perceived ease of use (Hong et al., 2006; Recker, 2010), perceived playfulness (Lin, Wu, & Tsai, 2005; Tao, Cheng, & Sun, 2009), perceived enjoyment (Kang, Hong, & Lee, 2009; Thong, Hong, & Tam, 2006), perceived system quality (Roca, Chiu, & Martinez, 2006; Islam, 2012), habit (Limayem, Hirt, & Cheung, 2007), and subjective norm (Bhattacharjee & Lin, 2015), to extend the IT continuance model. With respect to the role of ease of use, Bhattacharjee (2001a) claims that perceived ease of use plays no significant role in shaping IT continuance intentions as user concerns related to the difficulty of learning and using a new system becomes less relevant once users overcome their initial learning barrier and become comfortable with a system. Interestingly, however, several subsequent studies (e.g., Hong et al., 2006; Thong et al., 2006; Sorebo & Eikebrokk, 2008; Recker, 2010; Mäntymäki & Islam, 2014) have included perceived ease of use as a predictor of the continuance intention. In this paper, we argue that, instead of perceived ease of use, perceived usability is a more relevant factor in predicting continued IT usage than perceived ease of use. In Section 3, we explore perceived usability and perceived usefulness that we believe are salient in explaining continuance by virtue of their impact on confirmation and satisfaction.

3 Research Model and Hypotheses

3.1 Decomposing Expectation Confirmation Theory

We extend ECT by decomposing the confirmation of two salient beliefs that we presume to shape continuance intention of an IT system/service: usefulness and usability. A small number of previous IS studies have pursued a decomposed approach to ECT (e.g., Chiu et al., 2005; Venkatesh & Goyal, 2010; Terzis et al., 2013; Brown et al., 2012, 2014). In general, the findings of these studies imply that evaluating an IT at the attribute level helps one identify the most critical attributes in relation to IT continuance. The marketing literature also indicates that consumers with previous experience of a product will more likely evaluate their experience of it at the attribute level rather than at an aggregate level (Gardial et al., 1994). Thus, the decomposed approach is particularly meaningful in the post-adoption stage IT use.

Research in human-computer interaction (HCI) has advocated usability as a key driver of users' using a computer system. However, IS research has applied usability in a rather limited way. Applying usability to study use can provide an important alternative perspective relative to the psychological models that IS research typically employs (Venkatesh & Ramesh, 2006; Hoehle & Venkatesh, 2015). The International Organization for Standardization (ISO) defines usability as "the degree to which a product can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use" (ISO, 1998). Although the ISO (1998) definition commingles usability with utility in its definition, Nielsen (2012a) separates these two dimensions by arguing: "It matters little that something

is easy if it's not what you want. It's also no good if the system can hypothetically do what you want, but you can't make it happen because the user interface is too difficult". Nielsen (2012a) further highlights that usability and utility are equally important and together determine whether something is useful. Thus, research and development efforts should support and produce systems and applications that have both utility and usability. Thompson, Hamilton, and Rust (2005) also maintain that these two dimensions differ because they discuss that adding new features may have a positive influence on utility or capability but a negative influence on usability. Against this backdrop, it is surprising that IT continuance research has rarely considered these dimensions together. The IT acceptance and continuance literature represents the utility dimension as "perceived usefulness", which views IT as a utilitarian tool intended to improve user performance, efficiency, or productivity (Davis, 1989). Representing utility in this way is certainly appropriate for pSNS that offer utilitarian value through searching for employment opportunities and projects, obtaining and giving references, and reading news and articles. However, as we describe next, perceived usefulness alone does not sufficiently explain pSNS users' continuance decisions, and research should also incorporate the usability dimension.

Users may join a certain social network service based on their perceptions regarding the available features and capabilities, but, after they gain first-hand experience with the service, both the service's available features and their usability will likely influence their overall evaluation of the service and sustained engagement in it. If a social network service offers diverse functions (i.e., a high level of utility) but has a lower level of usability and a steep learning curve, users are more likely to experience stress and fatigue (Thompson et al., 2005; Lee, Shin, & Lee, 2016), which, in turn, may lead to discontinuance. Thus, usability is of critical importance in website development, where it is often referred to as Web usability (Venkatesh & Ramesh, 2006). User behavior studies on the websites report low tolerance among users for difficult designs or slow sites (Nielsen, 2012a). Users do not want to wait and do not want to go through a training session or a manual to use a website. If casual users deem a website as less usable, most will simply leave the website and move elsewhere. Hence, usability has emerged as the core of user experience (UX) design and the paradigm of user-centric design. Research has argued that usability is a broad construct that encompasses the overall user experience of a system rather than just the user interface (De Angeli, Sutcliffe, & Hartmann, 2006). Casalo, Flavian, and Guinaliu (2008) discuss the different aspects of perceived usability: 1) the ease of understanding the structure of the system, its functions, interface and the contents; 2) how easy it is to use; 3) the speed with which the users find relevant information; 4) the perceived ease of navigation in terms of time required and action necessary to obtain the desired results; and 5) users' ability to control what they are doing and where they are at any given moment. In turn, Lee et al. (2009) conceptualize perceived usability to include ease of use, visual attractiveness, user friendliness, and convenience in delivering the service. These conceptualizations clearly show that usability is a broader construct than ease of use and, thus, capable of explaining users' pSNS continuance decisions in and beyond the pSNS context. Thus, in line with the IT acceptance and continuance literature, we employ perceived usefulness to capture the utilitarian value of pSNS. Furthermore, we add usability as a new construct that is broader in scope than perceived ease of use.

Based on the above discussion, we decompose users' expectations and confirmation performance in the pSNS context in terms of perceived usefulness and perceived usability constructs. Confirmation refers to the discrepancy between a user's initial expectations of a system and its actual performance (Oliver, 1980; Bhattacharjee, 2001a). Although prior ECT research (Oliver, 1980; Bhattacharjee, 2001a; Bhattacharjee & Lin, 2015) has examined confirmation as an aggregate variable, we argue for a decomposed structure because usefulness and usability are distinct constructs and the confirmation of user expectations of usefulness may not necessarily imply the confirmation of usability and vice versa. Furthermore, the aggregated representation abstracts the confirmation of the different dimensions of perceived performance (cf. Oliver, 1980, p. 467), which limits the extent to which one may use design considerations to leverage the maximum use of a pSNS.

The ECT literature has documented satisfaction as an aggregate construct that represents users' overall affect toward a product or service (Oliver, 1980; Oliver, 1993). In contrast to confirmation, which is based on the realization of an individual's beliefs about a service, satisfaction, by definition, is a summative construct that captures user's "overall" judgment about a service's performance, and we retain it as such in our study. Table 1 defines the constructs in our research model, and Figure 3 presents the research model itself.

Table 1. Definitions of Constructs

Construct	Definition	Reference
Perceived usability	The design aspects of the user interface in terms of ease of use, visual attractiveness, user friendliness, and convenience in delivering the service.	Lee et al. (2009)
Perceived usefulness	The degree to which users believe that using a service will enhance their performance.	Bhattacharjee (2001a), Davis (1989)
Usability confirmation	The discrepancy between user's level of expectation regarding usability and a service's actual usability.	Oliver (1980), Bhattacharjee (2001a)
Usefulness confirmation	The discrepancy between a user's level of expectation regarding usefulness and a service's actual usefulness.	Oliver (1980), Bhattacharjee (2001a)
Satisfaction	User's overall feelings about using a service.	Bhattacharjee (2001a)
Continuance intention	The intention to continue using a service.	Bhattacharjee (2001a)

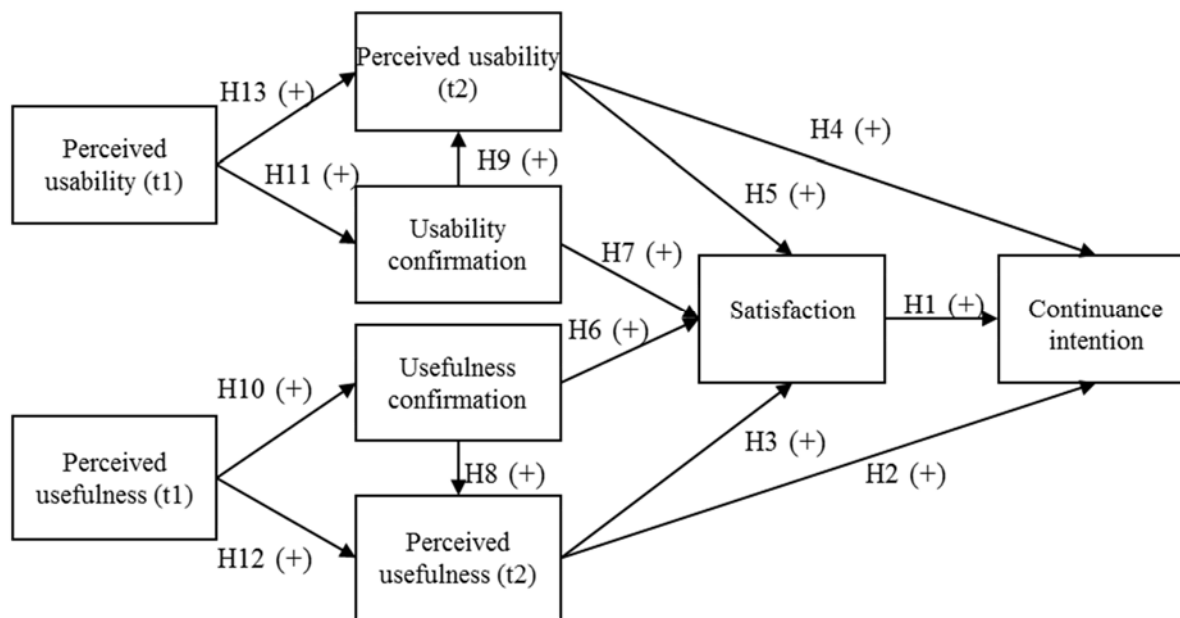


Figure 3. The Research Model

3.2 Hypotheses

According to ECT, satisfaction is the primary predictor of users' behavioral intention to use a product/service (Oliver, 1980). Researchers have empirically validated this relationship in different contexts such as e-learning usage (Roca et al., 2006; Terzis et al., 2013; Cheng, 2014), Internet usage (Lin et al., 2005; Hong et al., 2006; Kang et al., 2009), e-commerce usage (Bhattacharjee, 2001b), mobile data usage (Thong et al., 2006; Deng, Turner, Gehling, & Prince, 2010), and online community and social networking website usage (Jin, Lee, & Cheung, 2010; Chang & Zhu, 2012). Based on theory and empirical evidence, we hypothesize the following.

H1: Satisfaction with the service positively affects continuance intention.

Perceived usefulness, originally defined as the degree to which a user believes that using a particular system would enhance the user's job performance (Davis, 1989), captures the instrumentality of system use. Bhattacharjee (2001a) demonstrates that perceived usefulness, one of the primary determinants of initial IT acceptance, also influences decisions regarding IT continuance because instrumentality is an important reason for why one continues to use a system. Therefore, the IT continuance model proposes that perceived usefulness has a direct impact on satisfaction and continuance intention (Bhattacharjee, 2001a). Several subsequent studies have confirmed these associations in different contexts. For example,

Bhattacharjee (2001b) found these relationships significant among e-commerce service users and Thong et al. (2006) among mobile Internet users. Hsieh and Wang (2007) found perceived usefulness significant in predicting both satisfaction and extended use among enterprise resource planning users. Huang, Wu, and Chou (2013) found perceived usefulness had a strong effect on both satisfaction and continuance intention among data-mining tool users. Recently, Cheng (2014) confirmed these associations among blended e-learning users. Thus, we hypothesize:

H2: Perceived usefulness (t2) positively affects continuance intention.

H3: Perceived usefulness (t2) positively affects satisfaction with the service.

Previous studies have also investigated the direct effect of perceived usability on satisfaction. For example, Chiu et al. (2005) found perceived usability significant to predict satisfaction in e-learning context. Moreover, Flavian, Guinaliu, and Gurrea (2005) and Casalo et al. (2008) found significant positive relationship between perceived usability and consumer website satisfaction. Drawing on these findings, we argue that a pSNS that scores high on usability will leave its users satisfied with the service and encourage them to continually use it. Thus, we hypothesize:

H4: Perceived usability (t2) positively affects continuance intention.

H5: Perceived usability (t2) positively affects satisfaction with the service.

Similarly to ECT, the IT continuance model posits that the confirmation of expectations determines a user's satisfaction with a service (Bhattacharjee, 2001a). In other words, if the perceived performance exceeds the initial expectation, the expectation will be positively confirmed and the user will be satisfied with the IT. On the other hand, if the IT does not meet the initial expectation, confirmation will be negative, which will lead to dissatisfaction. Several studies have validated the association between confirmation and user satisfaction in different contexts (Deng et al., 2010; Hong et al., 2006; Liao et al., 2007; Lin et al., 2005). Thus, we hypothesize:

H 6: Usefulness confirmation positively affects satisfaction with the service.

H7: Usability confirmation positively affects satisfaction with the service.

Extending the IT continuance model, we propose that the decomposed confirmation beliefs influence expectations at a latter point of time and put forward the following arguments to support our hypotheses. During the post-adoption stage, users may change their expectations about the usability and usefulness of an IT as they interact with it and learn how to use it. Repeated interaction with the IT can help users build more concrete post-adoption expectations, which may differ from their prior expectations. For instance, if users' confirm their prior expectations, they may adjust their later expectations to a higher level. Conversely, if users' negatively confirm their prior expectations, they may lower their later expectations. Bhattacharjee and Premkumar (2004) argue that pre-adoption beliefs are the antecedents of confirmation while post-adoption beliefs are the consequences of confirmation. Based on these considerations, we hypothesize:

Hypothesis 8: Usefulness confirmation positively affects perceived usefulness (t2).

Hypothesis 9: Usability confirmation positively affects perceived usability (t2).

In the post-adoption stage of IT use, users primarily base their perceptions on the service on their first-hand experiences. Thus, compared to pre-adoption stage where users depend more on secondary sources of information, the post-adoption stage evaluations of usability and usefulness are likely to be more realistic and stable due to repeated interactions with the service (Bhattacharjee & Premkumar, 2004). While users may sometimes negatively confirm their expectations in the initial stages of user adoption due to the unstable nature of the initial expectations, during the post-adoption stage, users will likely positively confirm their more stable post-adoption expectations. Hence, we may expect post-adoptive IT users to largely confirm their usability and usefulness expectations that will result in a positive association with the respective confirmation constructs. Consequently, we hypothesize:

H10: Perceived usefulness (t1) positively affects usefulness confirmation.

H11: Perceived usability (t1) positively affects usability confirmation.

In ECT, Oliver (1980) describes a mediated model in which later belief and attitude mediated the impact of disconfirmation and satisfaction on later intention. Based on Oliver's (1980) partially mediated model, we propose prior beliefs to have direct effects on later beliefs in addition to the indirect effect via the confirmation constructs.

This perspective is theoretically supported by Helson's (1964) adaptation-level theory, which holds that individuals perceive new stimuli (experience) as deviations from existing cognitions (i.e., new cognitions), which the theory views as a shift from their prior baseline or reference levels (adaptation levels). According to adaptation-level theory, new cognitions tend to remain in the general vicinity of prior cognitions, adjusted appropriately for any new positive or negative stimuli (Bhattacharjee & Premkumar, 2004). As a result, one can view later beliefs as an additive function of prior beliefs plus the deviation or discrepancy from those levels due to actual experience.

Furthermore, the literature on consumer behavior offers abundant support for decisions and judgments made in relation to earlier judgments (see Mittal, Kumar, & Tsiros, 1999). In their longitudinal study on continued IT use, Kim and Malhotra (2005) found that users updated their beliefs about the usefulness and ease of use of an IT artifact over time.

Among continuing users, both t1 and t2 beliefs are based on first-hand experience, which is likely to increase the consistency between them. In addition, online service providers such as pSNS operators continuously aim to improve the user experience by introducing new features and developing more user-friendly interfaces. As a result, we posit that prior usefulness and prior usability act as determinants of later usefulness and usability and that the relationships are positive. As such, we hypothesize:

Hypothesis 12: Perceived usefulness (t1) positively affects perceived usefulness (t2).

Hypothesis 13: Perceived usability (t1) positively affects perceived usability (t2).

Finally, grounded on previous empirical studies on IS adoption and continuance (Venkatesh & Davis, 2000; Brown et al., 2014), we control for the effects of age, gender, and education on satisfaction and continuance intention.

4 Study Design

4.1 Measurement

We adopted multi-item measures for each of our constructs from the prior literature with minor changes in wording to reflect the target context of pSNS. We adopted perceived usefulness, usefulness confirmation, satisfaction, and continuance intention measures from Limayem et al. (2007) and Bhattacharjee (2001a). We adopted the measures of usability and usability confirmation from Lee et al. (2009) and McKinney, Yoon, & Zehedi, (2002). We measured each item using a seven-point Likert scale that ranged from "strongly disagree" to "strongly agree". Two senior information systems scholars reviewed the questionnaire, and we reworded some items based on their suggestions. Thereafter, five doctoral students reviewed each item to reconfirm the clarity and understandability of the questionnaire. Based their suggestions, we slightly reworded a few items. We modeled all constructs in the research model as reflective. Appendix B provides the final questionnaire.

4.2 Data Collection

We collected empirical data for our study via a Web-based survey from the alumni of a technical university in Bangladesh. We collected the data in two phases that occurred six-months apart. In the first phase, we collected initial user perceptions of usability and usefulness at time t1. In the second phase, we collected data regarding perceived usability and perceived usefulness at time t2 along with usability confirmation, usefulness confirmation, satisfaction, and continuance intention.

We sent a total of 300 invitations followed by a reminder email one week later. After filtering invalid and incomplete responses, we obtained a total of 160 survey responses. Six months later, we sent a follow-up Web survey was sent to the 160 people who responded to the first survey. After filtering the invalid and incomplete responses from second survey, we obtained 149 matched pairs of valid responses. We deleted 24 responses due to failing to answer check questions¹ throughout the survey, thus yielding an analysis sample of 125. Of the respondents, 73.6 percent were male. Their average age was 25 years' old. Further,

¹ To assure respondents reading and comprehending survey questions, we asked several questions throughout the survey. Respondents are asked to select the option that the question requested.

49.4 percent of respondents reported having a LinkedIn account for less than six months, whereas 45 percent reported to have had a LinkedIn account for one to two years at time t1.

4.3 Data Analysis and Results

We analyzed the survey data using the partial least squares (PLS) approach (Chin, 1998) with the SmartPLS 3.0 (Ringle, Wende, & Will, 2005) software. PLS is a second-generation regression method that combines confirmatory factor analysis with linear regression, which makes it possible to run the measurement and structural models simultaneously.

Because we sought to develop a decomposed IT continuance model, our model extends the original IS continuance model (Bhattacharjee, 2001a). According to Hair, Ringle, and Sarstedt (2011), PLS is the preferred choice when one seeks to extend existing (structural) theory. Furthermore, Goodhue, Lewis, and Thompson (2012) have shown that PLS performs as effectively as covariance-based structural equation modeling in detecting actual paths and does not falsely detect non-existent paths.

With respect to sample size, a rule of thumb size with PLS is that the sample should be at least ten times that of the most complicated multiple regressions in the model (Barclay, Higgins, & Thompson, 1995; Hair et al., 2011). The sample size here fulfills this criterion well.

We tested for convergent validity by examining whether all the items had factor loadings that were significant and exceeded a threshold value of 0.7 (Fornell & Larcker, 1981) and by checking that all the constructs had composite reliability values greater than 0.80 (Nunnally, 1978). As Table 2 shows, USAB-5 had a loading less than 0.7. However, we still kept this item as the composite reliability value exceeded the recommended threshold. We evaluated the discriminant validity by comparing the square roots of average variance extracted (AVE) values to the inter-construct correlations (Fornell & Larcker, 1981). Table 3 shows the correlation matrix with the square root of AVE values displayed along the principal diagonal. As the table shows, the square roots of the AVE values for the variables were consistently greater than the off-diagonal correlation values, which suggests satisfactory discriminant validity between the variables.

We also examined how well our model fitted the data to detect possible model misspecification (Henseler et al., 2013). To this end, we followed Henseler et al. (2013) and used the goodness-of-fit (GoF) and standardized root mean square residual (SRMR) statistics. We calculated GoF using the equation that Wetzels, Odekerken-Schroder, and van Oppen (2009) present and obtained a value of 0.51. According to Wetzels et al.'s (2009) criteria (small = 0.1, medium = 0.25, and large = 0.36), our model had good fit. For SRMR, we obtained a value of 0.08. According to Hu and Bentler (1999), SRMR below 0.10 or, more conservatively, 0.08 indicates good model fit. As a result, we conclude that our model exhibited good fit to the data.

Common method bias (CMB) can be a significant source of measurement error in survey research. We employed a longitudinal measurement, which mitigates the risk of CMB (Podsakoff, MacKenzie, & Lee, 2003). However, to evaluate any residual CMB, we conducted a test that Liang, Saraf, Hu, and Xue (2007) describe. We included a common method factor by reusing all the indicators from the principal constructs in the PLS model. We then calculated each indicator's variances substantively explained by the principal construct and by the method factor. The results demonstrate that the average substantively explained variance of the indicators was 0.63, and the average method based variance was 0.01. Given the small magnitude of method variance, we conclude that the CMB is unlikely to be a serious concern for this study.

Table 2. Internal Consistencies of Constructs

Construct	Item	Loading	CR	AVE
Continuance intention	INT-1	0.81	0.84	0.73
	INT-2	0.90		
Satisfaction	SAT-1	0.80	0.87	0.69
	SAT-2	0.79		
	SAT-3	0.90		
Perceived usefulness (t1)	PU-1	0.80	0.85	0.65
	PU-2	0.83		
	PU-3	0.79		
Usefulness confirmation	UC-1	0.70	0.80	0.57
	UC-2	0.83		
	UC-3	0.74		
Usability confirmation	USC-1	0.87	0.90	0.75
	USC-2	0.89		
	USC-3	0.84		
	USC-4	0.83		
	USC-5	0.85		
Perceived usability (t1)	USAB-1	0.74	0.85	0.53
	USAB-2	0.79		
	USAB-3	0.76		
	USAB-4	0.70		
	USAB-5	0.65		
Perceived usefulness (t2)	PU-1	0.75	0.84	0.64
	PU-2	0.81		
	PU-3	0.83		
Perceived usability (t2)	USAB-1	0.75	0.84	0.52
	USAB-2	0.75		
	USAB-3	0.74		
	USAB-4	0.70		
	USAB-5	0.65		

Note: CR = composite reliability, AVE = average variance extracted, ***p < 0.001

We examined the original IT continuance model (without usability and usability confirmation) as a baseline reference model and compared its explanatory power with our extended model. Our extended model explained 56 percent of the variance in satisfaction compared to the 39 percent with the baseline model (see Figure 4). A nested F-test confirmed that the increase in the explanatory power of the extended model was significant ($F(1, 117) = 22.60, p < 0.001$). Our model also accounted for 37 percent of the variance in the continuance intention compared to 33 percent for the baseline model. This increase in explanatory power was also statistically significant ($F(1, 118) = 7.49, p < 0.01$).

Perceived usefulness (t1) and usefulness confirmation explained 30 percent of the variance in perceived usefulness (t2). Perceived usability (t1) and usability confirmation explained 47 percent of the variance in perceived usability (t2). Finally, perceived usefulness (t1) accounted for 48 percent of the variance in usefulness confirmation, and perceived usability (t1) explained 29 percent of the usability confirmation.

Table 3. Correlation Among the Variables and the Square Root of the Average Variance Extracted Values)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Age (1)	1.00										
Continuance Intention (2)	0.08	0.85									
Education (3)	0.33	-0.08	1.00								
Gender (4)	0.07	-0.08	0.05	1.00							
Perceived Usability (t1) (5)	-0.14	0.50	-0.26	-0.17	0.73						
Perceived Usefulness (t1) (6)	-0.02	0.57	-0.15	-0.00	0.55	0.81					
Perceived Usability (t2) (7)	-0.01	0.53	-0.15	-0.11	0.63	0.55	0.72				
Perceived Usefulness (t2) (8)	0.01	0.40	-0.13	-0.10	0.46	0.52	0.59	0.80			
Satisfaction (9)	-0.09	0.54	-0.18	0.00	0.54	0.55	0.65	0.57	0.83		
Usability Confirmation (10)	-0.04	0.40	-0.05	-0.20	0.54	0.53	0.55	0.53	0.60	0.87	
Usefulness Confirmation (11)	-0.02	0.43	-0.10	0.13	0.36	0.69	0.40	0.45	0.45	0.36	0.76

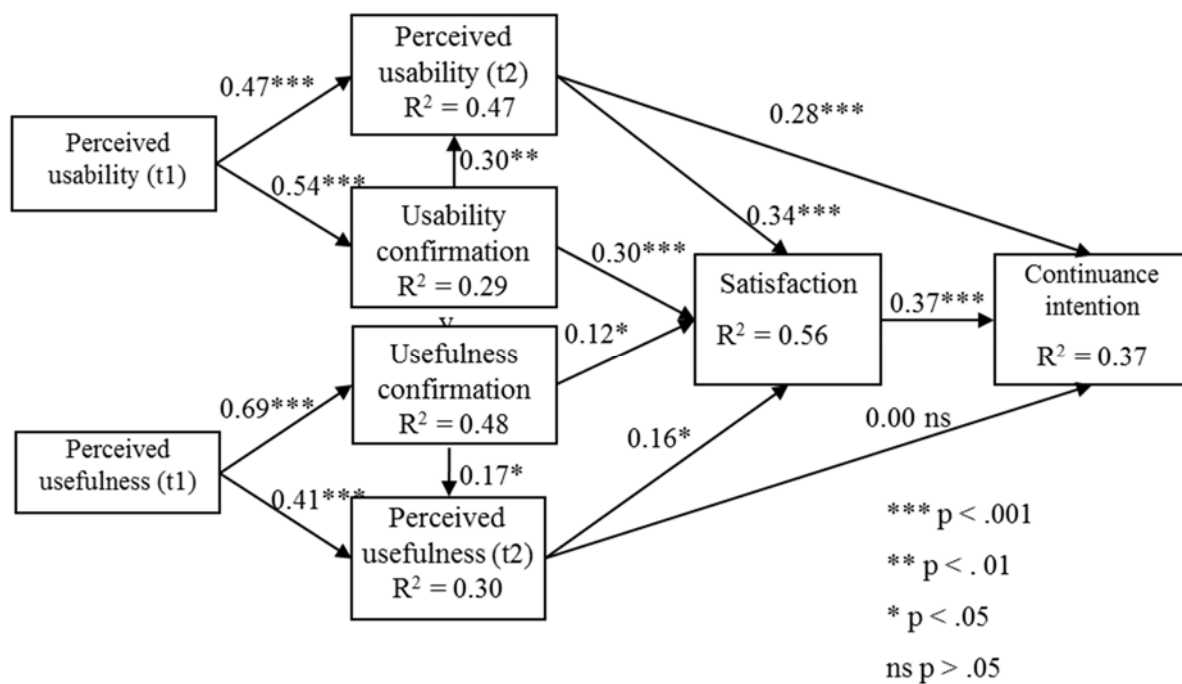


Figure 4. PLS Results

The data supported twelve of our thirteen hypotheses. Satisfaction ($\beta = 0.36$, $p < 0.001$) and perceived usability (t2) ($\beta = 0.28$, $p < 0.001$) were significant predictors of the continuance intention, which supports H1 and H4. Contrary to our hypotheses, perceived usefulness (t2) ($\beta = 0.00$, $p > 0.05$) had non-significant effects on the continuance intention. Hence, we did not find support for H2.

As hypothesized in H3, H5, H6, and H7, perceived usefulness (t2) ($\beta = 0.16$, $p < 0.05$), perceived usability (t2) ($\beta = 0.34$, $p < 0.001$), usefulness confirmation ($\beta = 0.12$, $p < 0.05$), and usability confirmation ($\beta = 0.30$, $p < 0.001$) had a significant influence on satisfaction. Both usefulness confirmation ($\beta = 0.17$, $p < 0.05$) and perceived usefulness (t1) ($\beta = 0.41$, $p < 0.001$) had a significant influence on perceived usefulness (t2), which supports H8 and H12. Similarly, we found support for both H9 and H13 because usability confirmation ($\beta = 0.30$, $p < 0.01$) and perceived usability (t1) ($\beta = 0.47$, $p < 0.001$) had a significant positive influence on perceived usability (t2). Finally, both perceived usefulness (t1) ($\beta = 0.69$, $p < 0.001$) and perceived usability (t1) ($\beta = 0.54$, $p < 0.001$) had a significant influence on usability confirmation and usefulness confirmation,

respectively. Thus, we found support for H10 and H11. Table 4 summarizes the results of our hypotheses testing.

Table 4. The results of hypotheses testing

Hypothesis	Result	Outcome
H1: Satisfaction with the service positively affects the continuance intention.	$\beta = 0.37, p < 0.001$	Supported
H2: Perceived usefulness (t2) positively affects continuance intention.	$\beta = 0.00, n.s.$	Not supported
H3: Perceived usefulness (t2) positively affects satisfaction with the service.	$\beta = 0.16, p < 0.05$	Supported
H4: Perceived usability (t2) positively affects continuance intention.	$\beta = 0.28, p < 0.001$	Supported
H5: Perceived usability (t2) positively affects satisfaction with the service.	$\beta = 0.34, p < 0.001$	Supported
H6: Usefulness confirmation positively affects satisfaction with the service.	$\beta = 0.12, p < 0.05$	Supported
H7: Usability confirmation positively affects satisfaction with the service.	$\beta = 0.30, p < 0.001$	Supported
H8: Usefulness confirmation positively affects perceived usefulness (t2).	$\beta = 0.17, p < 0.05$	Supported
H9: Usability confirmation positively affects perceived usability (t2).	$\beta = 0.30, p < 0.01$	Supported
H10: Perceived usefulness (t1) positively affects usefulness confirmation.	$\beta = 0.69, p < 0.001$	Supported
H11: Perceived usability (t1) positively affects usability confirmation.	$\beta = 0.54, p < 0.001$	Supported
H12: Perceived usefulness (t1) positively affects perceived usefulness (t2).	$\beta = 0.41, p < 0.001$	Supported
H13: Perceived usability (t1) positively affects perceived usability (t2).	$\beta = 0.47, p < 0.001$	Supported

5 Discussion and Implications

5.1 Key Findings

In this study, we modified the original ECT to view expectations and confirmation in a decomposed manner, comprising perceived usability and perceived usefulness. Our decomposed model explained more of the variance in continuance intention and satisfaction than the original IT continuance model (Bhattacharjee, 2001a). This result implies that a decomposed model of IT continuance may indeed be useful in obtaining an improved, and, importantly, a more fine-grained prediction of continued IT use. The decomposed model also provides opportunities for additional drill-down analysis to explore further the effects of different specific expectations on satisfaction and use decisions.

We found that satisfaction was the primary predictor of continuance intention followed by perceived usability at time t2. Interestingly, contrary to our hypothesis (H2), perceived usefulness at time t2 had a non-significant direct effect on continuance intention. Presumably, the effects of usability and satisfaction on continuance intention affected this non-significant relationship. In fact, if we remove the satisfaction-intention path, the effect of usefulness on intention increased to 0.14 but remained non-significant. If we then further remove the usability-intention path, the effect of usefulness increased to 0.40 and became significant. Altogether, these results suggest that usability and satisfaction are more important predictors of intention than usefulness. Furthermore, our results indicate that satisfaction fully mediates the effect of perceived usefulness on continuance intention. This finding deviates from the vast majority of prior IT continuance research that suggests satisfaction and perceived usefulness jointly predict continuance intention (for an overview, see, e.g., Islam & Mäntymäki, 2011).

Perceived usefulness (t2), perceived usability (t2), usefulness confirmation, and usability confirmation had significant effects on satisfaction. However, the usability side constructs (i.e., perceived usability and usability confirmation) had stronger effects on satisfaction than the usefulness side constructs (i.e., perceived usefulness and usefulness confirmation). Altogether, one may explain usability's relatively strong effects on satisfaction compared to usefulness by the fact that business professionals expect pSNS such as LinkedIn to offer a high-quality user experience compared to many other IT tools and applications they use on a regular basis to perform their work-related tasks. Thus, a high level of usability and meeting users' usability expectations is particularly critical for user satisfaction in voluntary IT use context such as pSNS.

5.2 Theoretical Implications

Our study makes three theoretical contributions to IT continuance research. First, by decomposing confirmation, we highlight the importance of the attribute-specific measurement of expectations and confirmations. In the case of IT in general and pSNS in particular, we note two salient attributes relevant to the understanding of users' continuance intentions (namely, usability and usefulness). While there may be additional attributes of relevance for IT continuance research, such considerations are left open for future research.

Second, we highlight the importance of usability in the IT continuance research in particular and in IT usage research in general (Venkatesh & Ramesh, 2006; Hoehle & Venkatesh, 2015). The usability construct is relatively new to IT continuance research (Hoehle & Venkatesh, 2015). It is also broader in scope than the more popular ease of use construct frequently used in IT usage research. While Bhattacharjee (2001a) claims that ease of use does not matter for continuance once users become habituated to the use of an IT, our results clearly indicate that usability considerations play a key role in shaping user satisfaction and, thereby, continuance intention in the pSNS context.

Third, we advance the understanding of expectation confirmation as a process. Bhattacharjee and Premkumar (2004) investigated how confirmation shapes perceived usefulness at the aggregate level, but our decomposed approach offers an attribute-level examination of how confirmation affects perceived usefulness. Our findings offer support for the three-stage IT continuance model that Bhattacharjee and Premkumar (2004) propose by showing that perceived usefulness, measured at time t_1 , is an antecedent of usefulness confirmation, while perceived usefulness, measured at a later time t_2 following usage experience, is the outcome of usefulness confirmation.

5.3 Implications for Practice

Our findings have three major implications for IT practice. First, the decomposed approach we used can help system designers focus on design attributes that will optimize the user experience and maximize satisfaction. SNS typically evolve at a fast pace as new functionalities are frequently added, and these changes can trigger users to reevaluate and subsequently alter how usable and useful they perceive a SNS to be. The decomposed approach we present should be better able to guide pSNS operators to concentrate on the factors that are most likely to improve user satisfaction and, consequently, foster continued use.

Second, we underscore the importance of expectation management on the attribute level to promote continuance. The results show that confirmation of expectations was an important determinant of user satisfaction. pSNS operators can manage expectations by clearly communicating the benefits of their services (e.g., for professional networking and career development), by measuring expectations in a longitudinal fashion, and by implementing strategies to ensure that these expectations are realized over time.

Third, our results show the importance of the confirmation process in shaping usability at a later point of time. Thus, service providers should focus on ensuring that the user experience remains consistent over time. As a result, to minimize users' need to adjust their usability expectations, we advise designers to be very cautious when considering making radical changes in the user interface.

5.4 Limitations and Future Research

As with any study, our study has its limitations. First, we collected empirical data from the users of a single pSNS service with a Southeast Asian background. As such, we do not know to what extent one can generalize our results to other user groups or other types of online services and IT applications.

Second, user expectations and confirmation of usability and usefulness are characteristically individual-level constructs. Since pSNS are essentially social systems, the social network, such as the size of one's network on the pSNS and the strength of ties with those connections, may influence user continuance decisions. Prior research suggests that actual (Katz & Shapiro, 1986) and perceived (Ku, Chen, & Zhang, 2013; Lin & Bhattacharjee, 2008; Mäntymäki & Islam, 2014) network externalities may influence the value and diffusion of social technologies. For example, users may decide to continue using a pSNS to stay in touch with their friends and connections on the website, even if they feel that it is of limited usefulness and usability. We recommend that future research consider the social dimensions of pSNS use in addition to other potentially useful individual variables to portray a more comprehensive explanation of pSNS continuance.

Third, people access online services such as pSNS with multiple devices, including personal computers, tablets, and mobile phones. The type of device individuals use and the website version they use (i.e., full website, mobile website, or the website via a downloaded application) will likely influence their perceptions of a website's usability. For example, Nielsen (2012b) states that creating an engaging user experience for a mobile device requires a considerably different design to that required for a desktop version. Consequently, future research could examine the extent to which the device used to access a service influences perceived usability and usefulness.

References

- Alraimi, K. M., Zo, H., & Ciganek, A. P. (2015). Understanding the MOOCs continuance: The role of openness and reputation. *Computers & Education, 80*(1), 28-38.
- Barclay, D., Higgins, C., & Thompson, R. (1995). The partial least squares (pls) approach to causal modeling: Personal computer adoption and use as an illustration. *Technology Studies, 2*(2), 285-324.
- Bhattacharjee, A. (2001a). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 251-370.
- Bhattacharjee, A. (2001b). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems, 32*(2), 201-214.
- Bhattacharjee, A., & Lin, C-P. (2015). A unified model of IT continuance: Three complementary perspectives and crossover effects. *European Journal of Information Systems, 24*(4), 364-373.
- Bhattacharjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude towards information technology usage: A theoretical model and longitudinal test. *MIS Quarterly, 28*(2), 229-254.
- Bhattacharjee, A., Perols, J., & Sanford, C. (2008). Information technology continuance: A theoretic extension and empirical test. *Journal of Computer Information Systems, 49*(1), 17-26.
- Boyd, D., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210-230.
- Brown, S. A., Venkatesh, V., & Goyal, S. (2012). Expectation confirmation in technology use. *Information Systems Research, 23*(2), 474-487.
- Brown, S. A., Venkatesh, V., & Goyal, S. (2014). Expectation confirmation research in information systems research: A test of six competing models. *MIS Quarterly, 38*(3), 729-756.
- Casalo, L., Flavian, C., Guinaliu, M. (2008). The role of perceived usability, reputation, satisfaction and consumer familiarity on the website loyalty formation process. *Computers in Human Behavior, 24*(2), 325-345.
- Chang, Y. P., & Zhu, D. H. (2012). The role of perceived social capital and flow experience in building users' continuance intention to social networking sites in China. *Computers in Human Behavior, 28*, 995-1001.
- Cheng, Y.-M. (2014). Extending the expectation-confirmation model with quality and flow to explore nurses' continued blended e-learning intention. *Information Technology & People, 27*(3), 230-258.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern business research methods* (pp. 295-226). NJ: Lawrence Erlbaum Associate.
- Chiu, C. M., Hsu, M. H., Sun, S. Y., Lin, T. C., & Sun, P. C. (2005). Usability, quality, value and e-learning continuance decisions. *Computers & Education, 45*(4), 399-416.
- Churchill, G. A., Jr., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of Marketing Research, 19*(4), 491-504.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.
- De Angeli, A., Sutcliffe, A., & Hartmann, J. (2006). Interaction, usability, and aesthetics: What influences users' preferences. In *Proceedings of the 6th Conference on Designing Interactive Systems*.
- Deng, L., Turner, D. E., Gehling, R., & Prince, B. (2010). User experience, satisfaction, and continual usage intention of IT. *European Journal of Information Systems, 19*(1), 60-75.
- Flavian, C., Guinaliu, M., & Gurrea, R. (2006). The role played by perceived usability, satisfaction and consumer trust on website loyalty. *Information & Management, 43*(1), 1-14
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

- Gardial, S., Fisher, D., Clemons, S., Woodruff, Schumann, D. W., & Burns, M. J. (1994). Comparing consumers' recall of prepurchase and postpurchase product evaluation experiences. *Journal of Consumer Research*, 20, 548-560.
- Goodhue, D. L., Lewis, W., & Thompson, R. L. (2012). Does PLS have advantages for small sample size or non-normal data? *MIS Quarterly*, 36(3), 891-1001.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-151.
- Helson, H. (1964). *Adaptation-level theory: An experimental and systematic approach to behavior*. Harper & Row, New York.
- Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J., Hair, J. F., Hult, G. T. M., & Calantone, R. J. (2014). Common beliefs and reality about partial least squares: Comments on Rönkkö & Evermann (2013). *Organizational Research Methods*, 17(2), 182-209.
- Hoehle, H., & Venkatesh, V. (2015). Mobile application usability: Conceptualization and instrument development. *MIS Quarterly*, 39(2), 435-472
- Hong, S.-J., Thong, J. Y. L., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile Internet. *Decision Support Systems*, 42(3), 1819-1834.
- Hsieh, J. J. P., & Wang, W. (2007). Explaining employee's extended use of complex information systems. *European Journal of Information Systems*, 16(3), 216-227.
- Hu, L.-T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, 3(4), 424-453.
- Huang, T. C.-K., Wu, I.-L., & Chou, C.-C. (2013). Investigating use continuance of data mining tools. *International Journal of Information Management*, 33, 791-801.
- Islam, A. K. M. N. (2012). The role of perceived system quality as the educators' motivation to continue e-learning system use. *AIS Transaction of Human-Computer Interaction*, 4(1), 25-44.
- Islam, A. K. M. N., & Mäntymäki, M. (2011). Culture and student samples as moderators of continued IT usage: a meta-analysis of IS continuance literature. In *Proceedings of the 15th Pacific Asia Conference on Information Systems*.
- ISO. (1998). *Ergonomic requirements for office work with visual display terminals (VDTs)—part 11: Guidance on usability*. Retrieved from <https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-1:v1:en>
- Jiang, J. J., Klein, G., & Saunders, C. (2012). Discrepancy theory models of satisfaction in IS research. In Y. K. Dwivedi, M. R. Wade, & S. L. Schneberger (Eds.), *Information systems theory* (pp. 355-381). Springer: New York.
- Jin, X.-L., Lee, M. O. K., & Cheung, C. M. K. (2010). Predicting continuance in online communities: Model development and empirical test. *Behavior & Information Technology*, 29(4), 383-394.
- Kang, Y. S., Hong, S., & Lee, H. (2009). Exploring continued online service usage behaviour: The roles of self-image congruity and regret. *Computers in Human Behavior*, 25(1), 111-122.
- Katz, M. L., & Shapiro, C. (1986). Technology adoption in the presence of network externalities. *The Journal of Political Economy*, 94(4), 822-841.
- Kim, B. (2010). An empirical investigation of mobile data service continuance: Incorporating the theory of planned behavior into expectation-confirmation model. *Expert Systems with Applications*, 37(10), 7033-7039.
- Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management Science*, 51(5), 741-755.
- Ku, Y.-C., Chen, R., & Zhang, H. (2013). Why do users continue using social networking sites? An exploratory study of members in the United States and Taiwan. *Information & Management*, 50(7), 571-581.

- Lee, A. R., Son, S.-M., & Kim, K. K. (2016). Information and communication technology overload and social networking fatigue: A stress perspective. *Commuters in Human Behavior*, 55, 51-66.
- Lee, S., Shin, B., & Lee, H. G. (2009). Understanding post-adoption usage of mobile data services: The role of supplier-side variables. *Journal of the Associations for Information Systems*, 10(12), 860-888.
- Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: The effects of institutional pressures and the mediating role of top management. *MIS Quarterly*, 31(1), 59-87.
- Liao C., Palvia, P., Chen, J.-L. (2009). Information technology adoption behavior life cycle: Toward a technology continuance theory (TCT). *International Journal of Information Management*, 29, 309-320.
- Liao, C., Chen, J. L., & Yen, D. C. (2007). Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-services: An integrated model. *Computers in Human Behavior*, 23(6), 2804-2822.
- Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly*, 31(4), 705-737.
- Lin, C. S., Wu, S., & Tsai, R. J. (2005). Integrating perceived playfulness into expectation-confirmation model for Web portal context. *Information & Management*, 42(5), 683-693.
- Mäntymäki, M., Islam, A. K. M. N. (2014). Social virtual world continuance among teens: uncovering the moderating role of perceived aggregate network exposure. *Behaviour & Information Technology*, 33(5), 536-547.
- McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of Web-customer satisfaction: An expectation-disconfirmation approach. *Information Systems Research*, 13(3), 296-315.
- Mittal, V., Kumar, P., & Tsiros, M. (1999). Attribute-level performance, satisfaction, and behavioral intentions over time: A consumption system approach. *Journal of Marketing*, 63(2), 88-101.
- Nielsen, J. (2012a). Usability 101: Introduction to usability. *Nielsen Norman Group*. Retrieved from <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>
- Nielsen, J. (2012b). Mobile site vs. full site. *Nielsen Norman Group*. Retrieved from <http://www.nngroup.com/articles/mobile-site-vs-full-site/>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw Hill.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(11), 460-469.
- Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20(3), 418-430.
- Overbeeke, C. J., Djajadiningrat, J. P., Hummels, C. C. M., & Wensveen, S. A. G. (2002). Beauty in usability: Forget about ease of use! In W. S. Green & P. W. Jordan (Eds.), *Pleasure with products: beyond usability* (pp. 9-16). New York: Taylor & Francis.
- Pew Internet Research. (2013). *Demographics of key social networking platforms*. Retrieved from <http://www.pewinternet.org/2013/12/30/demographics-of-key-social-networking-platforms/>
- Podsakoff, P. M., MacKenzie, S. B., Lee, Y.-L. (2003). Common method bias in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Recker, J. (2010). Continued use of process modeling grammars: The impact of individual difference factors. *European Journal of Information Systems*, 19(1), 76-92.
- Ringle, C. M., Wende, S., & Will, A. (2005). *Smart PLS 2.0 M3*. Retrieved from www.smartpls.de.
- Roca, J. C., Chiu, C. M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human-Computer Studies*, 64(8), 683-696.
- Ruth, R. D. (2012). Conversation as a source of satisfaction and continuance in a question-and-answer site. *European Journal of Information Systems*, 21(4), 427-437.

- Skeels, M., & Grudin, J. (2009). When social networks cross boundaries: A case study of workplace use of Facebook and LinkedIn. In *Proceedings of the ACM 2009 International Conference on Supporting Group Work*.
- Sorebo, O., & Eikebrokk, T. R. (2008). Explaining IS continuance in environments where usage is mandatory. *Computers in Human Behavior*, 24(5), pp. 2357-2371.
- Tao, T.-H., Cheng, C.-J., & Sun, S.-Y. (2009). What influences college students to continue using business simulation games? The Taiwan experience. *Computers & Education*, 53(3), 929-939.
- Terzis, V., Moridis, C. N., & Economides, A. A. (2013). Continuance acceptance of computer based assessment through the integration of user's expectations and perceptions. *Computers & Education*, 62, 50-61.
- Thompson, D. V., Hamilton, R. W., & Rust, R. T. (2005). Feature fatigue: When product capabilities become too much of a good thing. *American Marketing Association*, 42(4), 431-442.
- Thong, J. Y. L., Hong, S.-J., & Tam, K. Y. (2006). The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human-Computer Studies*, 64(9), 799-810.
- Venkatesh, V., & Davis F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(1), 186-204
- Venkatesh, V., & Goyal, S. (2010). Expectation disconfirmation and technology adoption: Polynomial modeling and response surface analysis. *MIS Quarterly*, 34(2), 281-303.
- Venkatesh, V., & Ramesh, V. (2006). Web and wireless site usability: Understanding differences and modeling use. *MIS Quarterly*, 30(1), 181-206
- Wetzels, M., Odekerken-Schroder, G., & van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, 33(1), 177-196.

Appendix A

Table A1. Review of ECT-based IT Continuance Literature

Key findings	Theories used	Context	Paper
Confirmation predicts satisfaction. In turn, satisfaction, along with perceived usefulness, predicts the continuance intention. However, the loyalty incentive moderates the relationship between perceived usefulness and the continuance intention	IT continuance model	E-commerce service users	Bhattacharjee (2001b)
IT users' beliefs and attitude toward IT change over time as they become more experienced. Disconfirmation and satisfaction are critical for understanding these changes.	IT continuance model	1) computer based training 2) rapid application development	Bhattacharjee & Premkumar (2004)
Disconfirmation and post-usage usefulness predicts satisfaction. Satisfaction and IT self-efficacy predicts continuance intention. Continuance intention and the facilitating conditions predict continuance behavior.	IT continuance model	Document management system users	Bhattacharjee, Perols, & Sanford (2008)
Perceived usefulness, satisfaction, and subjective norm predict continuance intention. Habit decreases the relationship between continuance intention and continuance behavior and directly affects continuance behavior.	IT continuance model, theory of reasoned action, habit	Insurance handling systems	Bhattacharjee & Lin (2015)
Perceived usefulness, confirmation, and flow predict satisfaction. In turn, satisfaction along with perceived usefulness and flow predict continued usage intention.	IT continuance model	Blended e-learning	Cheng (2014)
Perceived utilitarian performance, perceived hedonic performance, confirmation, and cognitive absorption predict satisfaction. In turn, satisfaction results in the continuance intention.	IT continuance model	Mobile Internet users	Deng et al. (2010)
Usability, usability confirmation, quality, and value affect satisfaction. Satisfaction affects the continuance intention.	ECT	E-learning users	Chiu et al. (2005)
Confirmation and perceived ease of use predict satisfaction. Satisfaction, perceived usefulness, and perceived ease of use predict continuance intention.	IT continuance model, TAM	Mobile Internet users	Hong et al. (2006)
Perceived usefulness and perceived ease of use predict both satisfaction and extended use.	IT continuance model, TAM	ERP users	Hsieh & Wang (2007)
The positive disconfirmation of the purpose value and the positive disconfirmation of the entertainment value drive satisfaction. Satisfaction and affective commitment predict continuance intention.	Decomposed ECT	Online community members	Jin et al. (2010)
Perceived usefulness and perceived enjoyment predict satisfaction. Past use, perceived usefulness, perceived enjoyment, satisfaction, self-image congruity, and regret (negative impact) predict continuance intention.	IT continuance model	Web-portal users	Kang et al. (2009)
Confirmation and perceived fee (negative impact) predict satisfaction. Perceived usefulness, perceived enjoyment, satisfaction, social norms, perceived behavioral control, and perceived fee (negative impact) predict continuance intention.	IT continuance model, TPB	Mobile data service users	Kim (2010)
Confirmation and perceived ease of use affect satisfaction. Satisfaction, subjective norms, and perceived behavioral control affect the continuance intention.	IT continuance model, TPB	E-learning users	Liao et al. (2007)
Confirmation and perceived usefulness predict satisfaction. In turn, satisfaction and perceived usefulness predict the continuance intention. Continuance intention predicts continued use behavior. Habit moderates this relationship.	IT continuance model	Internet users	Limayem et al. (2007)
Confirmation and perceived playfulness affect satisfaction. Perceived usefulness, perceived playfulness, and satisfaction affect the continuance intention.	IT continuance model	Web-portal users	Lin et al. (2005)

Table A1. Review of ECT-based IT Continuance Literature

Confirmation, perceived usefulness, perceived ease of use, and grammar familiarity predict satisfaction. Perceived ease of use, perceived usefulness, and satisfaction determine continuance intention.	IT continuance model	Process modeling grammar users	Recker (2010)
Information quality, system quality, service quality, confirmation, perceived usefulness, cognitive absorption, and perceived ease of use affect satisfaction.	IT continuance model, TAM, TPB	E-learning users	Roca et al. (2006)
Confirmation, perceived usefulness, and perceived ease of use predict satisfaction.	IT continuance model	Cash transaction system users	Sorebo & Eikebrokk (2008)
Confirmation, perceived ease of use, perceived usefulness, and perceived enjoyment predict satisfaction. Satisfaction, perceived usefulness, perceived ease of use, and perceived enjoyment predict continuance intention.	IT continuance model, TAM	Mobile Internet users	Thong et al. (2006)
Curvilinear models are more appropriate than linear models in explaining IT continuance when using ECT.	ECT	HRM users	Venkatesh & Goyal (2010)
Satisfaction predicts continuance behavior. Conversation predicts satisfaction.	IT continuance model	Question & answer web site users	Ruth (2012)
Confirmation, bridging social capital, and flow experience predict satisfaction. Satisfaction and bridging social capital predict continuance intention.	IT continuance model, social capital, flow	Social networking sites	Chang & Zhu (2012)
Confirmation, perceived usefulness, and task-technology fit predictor user satisfaction. User satisfaction, perceived usefulness, and habit predict continuance intention.	IT continuance model, task-technology fit, habit	Data mining tools	Huang et al. (2013)
Confirmation is decomposed as confirmed goals, confirmed usefulness, confirmed playfulness, confirmed ease of use, and confirmed content. Only confirmed ease of use and confirmed content predict continuance intention.	Decomposed ECT	Learning Management Systems	Terzis et al. (2013)
Perceived enjoyment is the main predictor of satisfaction. Satisfaction is a weak predictor of the continuance intention. Perceived aggregate network exposure moderates the relationships that affect the IT continuance intention.	IT continuance model, theory of network externalities	Social virtual world users	Mäntymäki & Islam (2014a)
Confirmation and perceived reputation predict satisfaction. Perceived usefulness, satisfaction, and perceived enjoyment predict continuance intention.	IT continuance model	Massive open online courses	Alraimi, Zo, & Ciganek (2015)

Appendix B

Table B1. Measurement Items

Construct	Item
Continuance intention	INT-1: I intend to continue using LinkedIn rather than discontinue its use
	INT-2: My intentions are to continue using LinkedIn than use any alternative means
Satisfaction	SAT-1: My overall experience of using LinkedIn is very satisfactory
	SAT-2: My overall experience of using LinkedIn is very pleasing
	SAT-3: My overall experience of using LinkedIn is very contented
Usefulness confirmation	UC-1: The benefit of using LinkedIn is better than what I expected
	UC-2: Sharing information using LinkedIn is quicker than what I expected
	UC-3: Communicating with others using LinkedIn is easier than what I expected.
Usability confirmation	USC-1: LinkedIn has a simpler layout than what I expected
	USC-2: LinkedIn is better organized than what I expected
	USC-3: LinkedIn is more user-friendly that what I expected
	USC-4: It requires fewer clicks to locate information than what I expected
	USC-5: It is easier to navigate than what I expected
Perceived usability	<i>Perceived usability was measured at both t1 and t2 with the following items:</i>
	USAB-1: LinkedIn has a simple layout for its contents
	USAB-2: LinkedIn is well organized
	USAB-3: LinkedIn is user-friendly
	USAB-4: It provides few clicks to locate information
	USAB-5: It is easy to navigate
Perceived usefulness	<i>Usefulness was measured at both t1 and t2 with the following items:</i>
	PU-1: Using LinkedIn is of benefit to me
	PU-2: Using LinkedIn enables me to accomplish information sharing more quickly
	PU-3: Using LinkedIn makes it easier to communicate with others

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