

# **The Effect of Emotions and Cognitions on Continuance Intention in Information Systems**

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*Abstract:* -While much of the prior studies on Information system (IS) adoption and usage continuance have examined cognitive factors, the emotion factors in understanding and predicting user behavior remained relatively unexplored. This study proposed a hybrid model that integrates emotion, cognition, satisfaction, and post adoption behavior in order to obtain a better understanding of users' continuance intention of IS. Three hundred and eighteen Blackboard Learning System (BLS) users were obtained from a survey. The paper assessed the psychometric properties of the measures through confirmatory factor analysis and then employed structural equation modeling analysis in order to examine the prospective model to better predict users' continuous adoption of IS. The results show that positive and negative emotions mediate the effect of confirmation and directly predict user satisfaction. However, perceived usefulness and perceived ease of use predict the level of user satisfaction better than emotions and perceived usefulness is the stronger predictor of user satisfaction than other variables.

*Key-Words:* - Confirmation, Perceived usefulness, Perceived ease of use, Positive emotion, Negative emotion, Satisfaction, Continuous adoption intention

## 1 Introduction

Understanding users' continuous usage of an IS is critical, as the previous studies in consumer behavior show that it costs five times as much to acquire a new customer than to retain an existing one. In addition, users in general have a substantial body of IS experience, which makes continuance usage increasingly important (Karahanna et al., 1999; Hong et al., 2008). For example, when it comes to information service free of charge such as Internet service providers, online newspapers, and website portals, users are free to choose either to stay or to leave. Hence, the subsequent continued usage of the service is central to the long term viability of many IS providers.

IS continuance is a form of post-adoption behavior. It depicts behavior patterns reflecting the continued use of a particular IS. Bhattacharjee (2001) proposed a model in line with the Expectation-Confirmation Theory (ECT) to explain users' intention to continue using an IS. His investigation supported the hypothesized relationships between (dis)confirmation, satisfaction, perceived usefulness, and continuance intention.

Bhattacharjee's (2001) work has led to a substantial body of research proposing hybrid models to advance our understanding of users' continuance intention to use a particular IS (E.g., Hong et al., 2006; Liao et al., 2007; Premkumar and Bhattacharjee, 2007; Tsai and Huang, 2007). These hybrid models were built by integrating ECT into TAM (Technology Acceptance Model), TPB

(Theory of Planned Behavior), or IDT (Innovation of Diffusion Technology). Among them, the most popular framework has been the integration of ECT and TAM (Liao et al. 2007; Bhattacharjee, 2001; Thong et al., 2006; Roca et al., 2006). Nevertheless, these studies have been focused on exploring the cognitive predictors (i.e., perceived usefulness and perceived ease of use) influencing users' IS continuance usage behavior.

Studies on consumers' repurchase behavior have found emotion to be an important factor in satisfaction model and on enhancing the predictive power of the cognitive process (Bigne et al., 2005; Mano and Oliver, 1993; Muller et al., 1991; Westbrook, 1987; Westbrook and Oliver, 1991; Wirtz and Bateson, 1999). However, to the best of our knowledge, little study has yet theoretically proposed a model that drew on the literature on emotion to formulate a new integrated model. Hence, the objective of this research is to propose a hybrid model that integrates emotion, cognition, satisfaction, and post adoption behavior in providing a much broader perspective on explaining continued IS usage intention.

## 2 Literature review and hypotheses

Oliver (1980) proposed Expectation-Confirmation Theory (ECT) in the marketing literature to explain the determinants of consumer satisfaction/dissatisfaction and repurchase intention of products and services. Oliver (1980) suggested that consumers form an

initial expectation (pre-expectation) prior to using the product. The satisfaction of consumers is determined by their pre-expectation and the extent to which their pre-expectation were (dis)confirmed. (Dis)confirmation represents the (mis)match between the pre-expectation and the perceived performance of product or service. Consumers' expectation are confirmed when the performance of a product or service is as much as expected. Positive disconfirmation occurs when the product or service performs better than expected. Negative disconfirmation occurs when the product or service performs worse than expected. Hence, consumers can be satisfied if they are confirmed or positively disconfirmed. In turn, satisfied customers form intentions to reuse the product or service in the future, while dissatisfied consumers discontinue its subsequent use or purchase.

ECT-based models were validated by various empirical studies. For example, Bruce (1998) examined the satisfaction rate of Australian students in searching information over the internet and found that effect of pre-expectation on satisfaction is direct and positive. Ladhari (2007) also found similar results. Bhattacharjee (2001)'s study supported the role of satisfaction in determining IS continuance intention. Similar findings include the work of Hong et al. (2006) on digital systems learning usage and the Liao et al.'s (2007) study on e-government service. Accordingly, we propose the following hypothesis:

**H1: Satisfaction positively affects user continuance intention of IS.**

**H2: Confirmation positively affects user satisfaction of IS.**

TAM posits that users' satisfaction with an IS and intention to adopt an IS are determined by two major perceptual factors: perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness is defined by Davis (1989) as the extent to which a user believes that using a particular system would enhance his or her job performance. Perceived ease of use can be described as the degree to which a user believes that adopting a particular system is free of effort. TAM also postulates that perceived usefulness will be influenced by perceived ease of use.

While TAM was originally developed to explain users' initial adoption of a new IS, many studies applied TAM to examine users' adoption intention after they had adopted and were using the IS. Examples include Taylor and Todd's (1995) study on usage intentions of a computing service facility, Davis's work on e-mail system (1989), and Konana and Balasubramanian's (2005) work on online investing adoption. In summary, TAM seems to successfully predict users' acceptance of various corporate IS (Adams et al., 1992; Chin and Todd, 1995) and is stable across people and context (Hasan and Ahmed, 2007). With all of this in mind, we propose the following hypotheses:

**H3: Perceived usefulness positively affects user satisfaction of IS.**

**H4: Perceived ease of use positively affects user satisfaction of IS.**

**H5. Perceived ease of use positively affects perceived usefulness of IS.**

Researches in consumer behavior have found that emotion coexists with cognition (i.e. confirmation) in the formation of satisfaction (Mano and Oliver, 1993; Mooradian and Oliver 1997; Philips and Baumgartner, 2002). The emotions expressed by humans can be divided into two positive and negative emotions (Westbook, 1987). Positive emotions express an intention to include while negative emotions express an attempt to exclude. Positive emotions that users feel from using an IS can be described as happy, cheerful, glad, warm, vigorous, and enthusiastic (Elsbach and Barr, 1999; Hockey et al., 2000; Sanna, 1998). Negative emotions are emotions users feel sad, frustrated, angry, scared, fearful, and distressed in response to using an IS.

Positive and negative emotions are not necessarily two entirely opposite states (Goldstein and Strube, 1994). In other words, positive emotions do not necessarily correspond to the opposite of negative emotions. In the case of IS adoption, because users might experience multiple aspects of IS simultaneously, multiple appraisals attributed to those aspects can bring out multiple emotional states (positive or negative emotions). Researches in consumer behavior have recognized these types of dual experiences of negative and positive emotions in consumption (Oliver, 1993; Mano and Oliver, 1993; Mooradian and Oliver, 1997).

Users can experience different

emotions through the various stages of IS adoption process. Previous studies have shown that emotions may be determined by the confirmation of product or service experienced (Mooradian and Oliver, 1997). Confirmation is a cognitive evaluation after the adoption of an IS. According to Roseman's appraisal theory of emotion (1984), the appraisals of an IS can trigger specific reactions which has much to do with the amount of motivational consistency. In a sense, a user experiences specific emotional state (i.e. positive emotion and negative emotion respectively) when the appraisals of an IS that is either motive consistent (confirmation or positive disconfirmation) or motive inconsistent (negative disconfirmation). Bigne et al. (2005) examined the effects of theme parks experience on guests. They found that positive emotions resulted from the positive disconfirmation of the experiences and vice versa. Other studies also found the similar results, including the works of Phillips and Baumgartne (2002) and Wirtz and Bateson (1999). Hence, it would be expected that the similar causal relationships hold as follows.

**H6: Confirmation positively affects positive emotion.**

**H7: Confirmation negatively affects negative emotion.**

Previous studies have shown that emotions help direct attention toward experiences and initiate belief-forming processes (Goldberg et al., 1999; Weiner, 1985, 1986). In the case of IS adoption, (dis)confirmation of IS performance can

trigger emotions, leading users to form beliefs about the IS. Davis (1989) pointed out that the principal concepts among the beliefs of adoption are perceived usefulness and perceived ease of use. Hence, confirmation or positive disconfirmation of IS experience may trigger positive emotions, directing users to recognize the IS as useful and/or ease of use. On the contrary, negative disconfirmation of IS experience may elicit negative emotions, leading users to perceive the IS as not so useful and/or ease of use.

Prior research in consumer behavior has found that emotions played a critical role in determining the perceptions of company image and product attributes (Gountas and Gountas, 2007). Consumers perceived more positive company image and product attributes when they reported more positive emotions. On the other hand, more negative emotions caused more negative evaluation of company image and product attributes. Hence, we propose:

**H8 □ Positive emotion positively affects perceived usefulness of IS.**

**H9 □ Positive emotion positively affects perceived ease of use of IS.**

**H10 □ Negative emotion negatively affects perceived usefulness of IS.**

**H11 □ Negative emotion negatively affects perceived ease of use of IS.**

Previous studies have found a valence-congruent relationship between emotions and product or service satisfaction (Dube-Rioux, 1990; Oliver, 1993; Westbrook, 1987; Mooradian and Olver, 1997). Satisfaction is decreased by negative emotions and increased by positive emotions either in normal product usage or in response to a service failure. Results found similar effects include the work of Philips and Baumgartner (2002) on orange juice experiment, the work of Oliver (1993) on vehicles and course demand, and the work of Dube-Rioux (1990) on restaurant service.

**H12: Positive emotion positively affects user satisfaction of IS.**

**H13: Negative emotion negatively affects user satisfaction of IS.**

In summary, the theoretical basis supporting the hypotheses of the model that integrates emotions, cognition, satisfaction, and continuance intention behavior is shown in Figure 1.

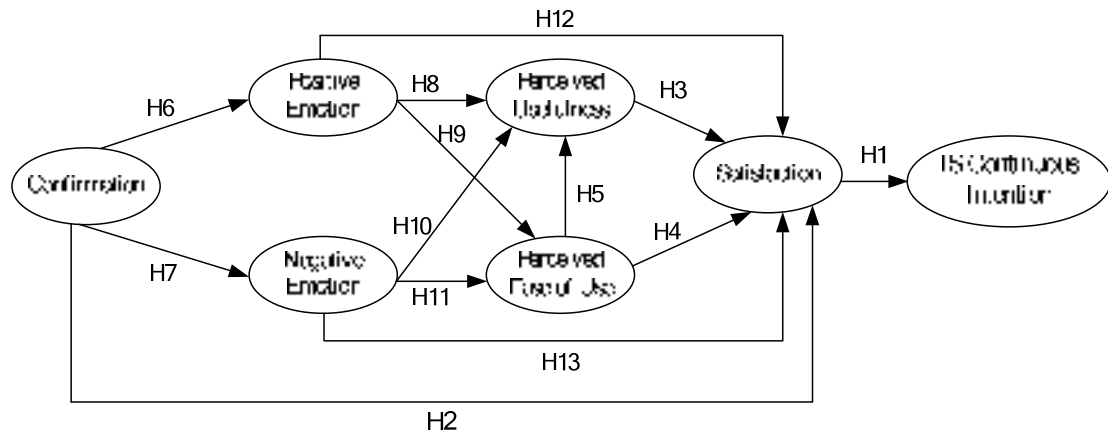


Fig. 1. Theoretical model and hypotheses.

### 3 Research method

#### 3.1 Participants and the IS

The hybrid model was empirically tested using data collected from an online survey of Blackboard Learning System (BLS) users. BLS is a web-based server software platform that offers open architecture for delivering online course materials, assignments, and syllabi. The system also offers threaded discussion boards and online lecture. Hence, the purpose of BLS is to provide a way to enhance both the teaching and learning. BLS has been gaining wide acceptance among universities, given the rapid acceptance of, and changes in, IS.

Subjects for this study were undergraduate students who have registered to use the BLS. The survey was conducted during the academic year 2007. A total of 1200 questionnaires were sent out, and 318 valid surveys were obtained. The sample consists of 181 female (56.9%) and 137 male respondents (43.1%). Majority of the respondents regularly spent more than 1 hour a day using BLS (86.8%). The average time span (experience) of using BLS amounts to 2 years.

#### 3.2 Construct measurement

The scale items were taken from previous studies and modified to suit the context of the current study (see Appendix 1). IS continuance intention refers to user intention to continue using the IS (Mathieson, 1991). Satisfaction refers to user experience evaluation of an IS adoption. The measurement items developed by Spreng et al. (1996) were used. This paper adopted the conceptual definitions and measurement scales of perceived usefulness and perceived ease of use by Davis (1989). Perceived usefulness refers to the belief of increased performance for users adopting a certain system. Perceived ease of use refers to the user's belief of how difficult it is to use a certain system.

Within the context of IS usage behavior, emotions can be measured by the feelings of using IS. Positive emotions are induced when users experience feelings of joy and interest while negative emotions are formed when users experience feelings of anger, disgust, and contempt (Westbrook, 1987). DES scale developed by Izard (1977) was used to measure these two constructs.

For the confirmation, the operational definition and measurement items developed by Oliver (1980) were used. Oliver (1980) defined confirmation as the objective judgment of consumers on the difference in experience of pre-expectation and actual experience.

### 3.3 Scale validation

Structural equation modeling (SEM) was adopted to validate the instruments for unobserved constructs and test the research models. The reliability of measurement items was assessed by the internal consistency method. Cronbach's alpha provides a reasonable estimate of internal consistency. These values range from 0.70 to

0.95. All values surpass the recommended value of 0.6 or 0.7 (Nunnally, 1978). The details of the reliability test are shown in Table 1.

Convergent validity was also assessed. Convergent validity of research instruments is commonly estimated by assessing item reliability, construct reliability, and average variance extracted (AVE) (Fornell and Larcker, 1981). All constructs exceed the recommended level of construct reliability 0.80 and AVE 0.5 (Chau, 1997). The details of the convergent validity test in Table 1 show that these results provide support for the convergent validity.

Table 1  
Confirmatory factor analysis results

Construct measurement	Mean	Standard deviation	Factor loadings	Composite reliability	AVE
IS continuance intention				0.93	0.81
CITI1	4.46	1.25	0.82		
CITI2	4.80	1.18	0.95		
CITI3	4.79	1.24	0.92		
Satisfaction				0.87	0.70
SAT1	4.43	1.13	0.90		
SAT2	4.77	1.17	0.90		
SAT3	4.36	1.12	0.70		
Perceived Usefulness				0.91	0.71
PU1	4.30	1.15	0.70		
PU2	4.35	1.20	0.87		
PU3	4.50	1.24	0.89		
PU4	4.42	1.21	0.89		
Perceived ease of use				0.93	0.77
PEU1	4.59	1.18	0.85		
PEU2	4.36	1.18	0.83		
PEU3	4.50	1.19	0.93		
PEU4	4.52	1.16	0.90		

Positive emotion				0.83	0.71
PE1	4.08	1.02	0.85		
PE2	3.89	0.98	0.83		
Negative emotion				0.93	0.83
NE1	3.19	1.28	0.93		
NE2	3.08	1.29	0.95		
NE3	2.97	1.32	0.85		
Confirmation				0.90	0.76
CON1	4.25	1.07	0.82		
CON2	4.41	1.20	0.88		
CON3	4.24	1.20	0.91		

Discriminant validity can be checked by comparing the squared correlation between two constructs with their average variances extracted. Discriminant validity is demonstrated if the AVE of both constructs

is greater than the squared correlation (Chau, 1997). The test results indicate that the discriminant validities between constructs are within the criteria. The details are shown in Table 2.

Table 2  
AVE and shared variances

	Confirmation	Positive emotion	Negative emotion	Perceived usefulness	Perceived ease of use	Satisfaction	IS continuance intention
Confirmation	<b>0.81</b>						
Positive emotion	0.635	<b>0.70</b>					
Negative emotion	-0.318	-0.269	<b>0.71</b>				
Perceived usefulness	0.76	0.616	-0.267	<b>0.77</b>			
Perceived ease of use	0.69	0.572	-0.352	0.693	<b>0.71</b>		
Satisfaction	0.597	0.506	-0.280	0.701	0.593	<b>0.83</b>	
IS continuance intention	0.502	0.487	-0.182	0.617	0.505	0.756	<b>0.76</b>

#### 4. Data analysis and results

Structural equation modeling (SEM) analysis was employed using LISREL 8.50 to assess the proposed model. SEM has been suggested as being useful for examining theoretically justified model such as the one in this study (Bagozzi and Yi, 1988; Bentler, 1989). The maximum likelihood estimation

(MLE) was used to estimate variables.

The test results indicate that all fit indices (GFI=0.86, AGFI=0.81, NFI=0.94, NNFI=0.94, CFI=0.95, IFI=0.95, RMSR=0.87, RMSEA=0.08) correspond with their recommended values commonly suggested in prior literature (Chau, 1997), providing support for an adequate model fit



with data gathered. The path coefficients show the strengths of the relationships between the dependent and independent variables. R2 values represent the amount of variance explained by the independent variables. Figure 2 shows the results of the structural model.

Figure 2 shows salient relationships among variables, except the path between confirmation and satisfaction. R2 values

range from 0.44 (negative emotion) to 0.75 (IS continuance intention). The effect of the newly added positive emotion and negative emotion were salient. Positive emotion had direct positive effect on perceived usefulness ( $\beta = 0.48$ ), perceived ease of use ( $\beta = 0.63$ ), and satisfaction ( $\beta = 0.22$ ). Negative emotion had negative impact on perceived usefulness ( $\beta = -0.45$ ), perceived ease of use ( $\beta = -0.22$ ) and satisfaction ( $\beta = -0.14$ ).

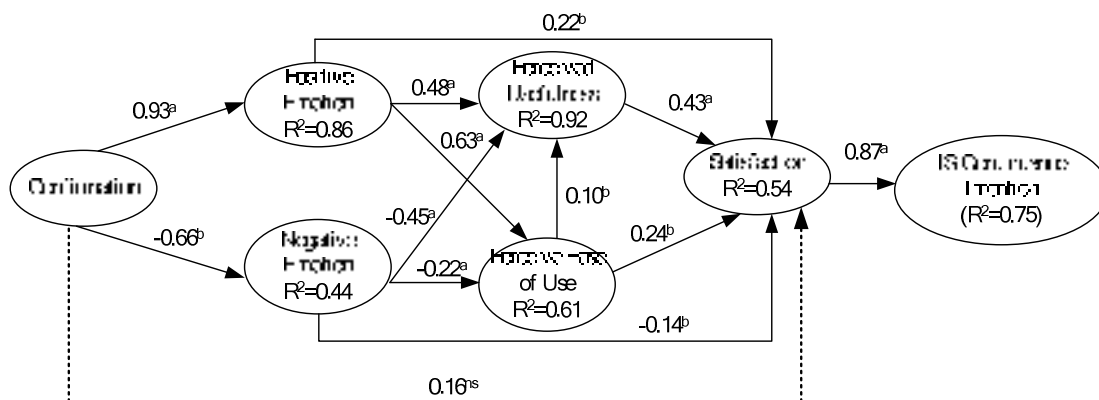


Figure 2: Analysis results (<sup>a</sup>p<0.01; <sup>b</sup>p<0.05 ns>0.05)

### 5 Discussion

The objective of the current research is to study a hybrid model that integrates emotion, cognition, satisfaction, and post adoption behavior. The model demonstrated adequate fit with the data. Further, all the causal relationships in this model, except for confirmation to satisfaction, were found to be significant. We discuss some interesting results below.

Confirmation significantly associated with both positive emotion and negative emotion supporting both the theory of cognitive appraisal of emotion (Roseman, 1984) and previous study (Mooradian and Olver, 1997). Past research linking emotion

and satisfaction found that product satisfaction is decreased by negative emotion and increased by positive emotion (e.g., Oliver and Swan, 1989; Mano and Oliver, 1993; Mooradian and Olver, 1997). The results of our study were consistent with past results.

The result shows that positive emotions lead to increased levels of perceived usefulness, perceived ease of use, and user satisfaction than negative emotions for the same IS, indicating that users appraise more positively in perceived usefulness, perceived ease of use, and satisfaction when they are in good mood. Perceived usefulness and perceived ease of use predict the level of

user satisfaction with IS better than emotions, suggesting that these two variables mediate the effect of emotions on satisfaction. Perceived usefulness is the stronger predictor of user satisfaction than perceived ease of use. Consistent with the findings of previous research (Bhattacharjee, 2001; Premkumar and Bhattacharjee, 2007), satisfaction has a direct and positive effect on IS continuance intention.

As a conclusion, cognitive evaluation after the use of IS produces the (dis)confirmation. Users' appraisal of the situational state (i.e. confirmation or disconfirmation) elicits positive and negative emotions. Positive emotions lead to increased cognitive load in working memory, and, hence, users might perceive the IS more useful and ease of use. Higher level of perceived usefulness and perceived ease of use will elevate the level of satisfaction, which in turn produces higher level of IS continuance intention.

### **5.1 Implications**

On a practical level, according the findings of this study, IS providers must take into account all the three aspects of emotions, cognitive beliefs (perceived usefulness and perceived ease of use), and satisfaction. They should design the IS that can exceed users' expectations and hence trigger users' positive emotional responses and minimize their negative emotions. This in turn will make the system appear useful and more ease-of-use and ensure user satisfaction with IS adoption. Satisfaction then leads to increase the continuance intention to use the IS. Avoiding users to have negative

emotions with IS is very important since negative emotions trigger users feel less ease-of-use of the system and less satisfaction with the system.

On a theoretical level, the present study contributes to the body of knowledge of IS continuance intention by integrating the emotion, cognition, and satisfaction in a model. The introduction of the emotion as the post-adoption behavior presents opportunities for further studies that can contribute to the understanding of users' post adoption behavior.

### **5.2 Limitations and future research**

One limitation originates in the biases inherent in most research. The current study only considers BLS as the stimuli and hence we should be cautious about the generalization of the results. However, while this limitation is noted, it should not undermine the results because the increasing use of online interfaces as a tool for learning.

More research is needed to further validate the model with a population of a different type of IS users. It will be interesting to know if the model can hold across different IS and IS users. Introducing moderating effects of user characteristics is also another way to further the knowledge. Mooradian and Oliver (1997) noted that there exists a relationship between personality, emotions, cognition, and satisfaction. Users who are more extroverts are more likely to have positive emotions toward adopting IS and hence are more like to be satisfied.

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## **Appendix 1: Measurement Indicators**

### **IS continuance intention (Strongly disagree ... Strongly agree)**

- CITI1 I intend to continue using BLS rather than discontinue it use.
- CITI2 My intentions are to continue using BLS than use any alternative means.
- CITI3 If I could, I would like to continue using BLS as much as possible.

**Satisfaction (7-point semantic differential scale)**

How do you feel about your overall experience of BLS use?

- SAT1           Very dissatisfied/Very satisfied.
- SAT2           Very displeased/Very pleased.
- SAT3           Very frustrated/Very contented.
- SAT4           Absolutely terrible/Absolutely delighted.

**Perceived usefulness (Strongly disagree ... Strongly agree)**

- PU1       Using BLS enhances my effectiveness.
- PU2       Using BLS increases my productivity.
- PU3       Using BLS improves my performance.
- PU4       Overall, BLS is useful in searching information.

**Perceived ease of use (Strongly disagree ... Strongly agree)**

- PEU1       Learning to use BLS is easy for me.
- PEU2       My interaction with BLS is clear and understandable.
- PEU3       I believe it is easy to get the BLS to do what I want it to do.
- PEU4       Overall I believe BLS would be easy to use.

**Positive emotion (Strongly disagree ... Strongly agree)**

- PE1       Whenever I use the BLS, I always feel interest.
- PE2       Whenever I use the BLS, I always feel joy.

**Negative emotion**

- NE1       Whenever I use the BLS, I always feel anger.
- NE2       Whenever I use the BLS, I always feel disgust.
- NE3       Whenever I use the BLS, I always feel contempt.

**Confirmation**

- CON1    My experience with using BLS was better than what I expected.
- CON2    The service level provided by BLS was better than what I expected.
- CON3    Overall, most of my expectations from using BLS were confirmed.