

A balanced thinking–feelings model of information systems continuance

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Abstract

Most studies on technology adoption and usage continuance examine cognitive factors, leaving affective factors or the feelings of users relatively unexplored. In contrast, researchers in the diverse fields of human–computer interaction, medicine, psychology and marketing have begun to note the importance of feelings in understanding and predicting human behavior. Feelings are anticipated to be essential particularly in the context of modern applications, such as mobile Internet (M-Internet) services. Users of modern technology are not simply technology users but also service consumers and may consider both cognitive and emotional benefits. Drawing upon multidisciplinary findings, this study proposes a balanced thinking–feelings model of IS continuance. In the process of developing this model, the concepts of attitude, thinking and feelings are further articulated, defined and distinguished. The balanced thinking–feelings model is validated in a survey of M-Internet service users. To encourage continuance, companies should consider ways to enhance both cognitive and emotional benefits for users. The model could be also useful for balanced understanding of other behaviors.

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1. Introduction

The last decade has seen an increasing body of information technology (IT) adoption studies. The adoption studies recognize initial acceptance as a critical step toward realizing information systems (IS) success. However, the feasibility of IS and their eventual success depend on continued usage more than on initial adoption. Without effective long-term use, initially adopted IS resources are wasted, which may have serious consequences.

The focus of research on IT adoption and post-adoption or IS continuance has been on mainly cognition-oriented behavioral models, such as the technology acceptance model (TAM) (Davis, 1989; Davis et al., 1989), the Theory of Planned Behavior (Ajzen, 2001) and the IS continuance model (Bhattacharjee, 2001). Cognition (i.e., thinking) means the mental process of knowing, including aspects such as perception, reasoning, and judgment. Belief may result from perception and reasoning. Belief is defined as

the individual's subjective probability that performing the target behavior will result in a specified outcome (Fishbein and Ajzen, 1975). TAM (Davis, 1989; Davis et al., 1989) posits that two beliefs, perceived usefulness and perceived ease of use, are central determinants of users' adoption intention. Similar to TAM, TPB (Ajzen, 1991) considers beliefs, attitude, subjective norm, and perceived behavioral control. Attitude is conceptualized as judgment (Ajzen, 2001). Subjective norm refers to the perceived social pressure to perform or not to perform a certain behavior. Perceived behavioral control is the individual's belief concerning how easy or difficult it is to perform the behavior. Further, IS continuance model (Bhattacharjee, 2001) considers perceived usefulness, confirmation, and satisfaction. Confirmation is another cognitive approach that builds on cognitive comparison between perceived performance and cognitive standards (e.g., expectations). For this reason, it has been argued that satisfaction highlights the concept of evaluative judgment (Ajzen, 2001; Oliver, 1993; De Wulf et al., 2006). All these models should be considered as cognitive models as they all rely on beliefs to predict user behaviors.

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Cognition-oriented models may be important for mandatory IS usage in the organizational setting where cost of adoption and usage is borne by the organization, e.g., for traditional technologies, such as word processor, spreadsheet, and email, where most users are employees in organizational settings. In such environments, personal liking or the affective experience factors may not be important.

However, the emergence of the Internet and mobile technologies has generated new forms of information and communication technology (ICT) that are used in non-organizational settings. An example is the mobile Internet (M-Internet), which provides diverse services to users. In contrast to users of traditional technologies, adopters of new ICT use the technology for personal purposes and the cost of voluntary adoption and usage is borne by the individuals. In contrast to traditional users, such users play the dual role of technology user and service consumer. As a technology user, instrumental (economic/cognitive view of consumption) benefits are more important. As a service consumer, emotional (hedonic view of the situation) benefits are also important. Both types of benefit may affect decision making (Derbaix and Pham, 1991; van der Heijden, 2004). Thus, there is a need to give more emphasis to emotional factors as the advancement of new ICT. Furthermore, many disciplines have shown that emotions are important for many behaviors. As a result, researchers have advocated the extension of the traditional one-sided cognitive view by integrating the affective components of consumption experiences (Holbrook et al., 1990; Kempf, 1999). For this reason, feelings or emotions¹ are expected to feature prominently together with thinking in IS continuance studies.

This study aims to examine IS continuance intention at the individual level, from a balanced thinking and feelings perspective. Specifically, we seek to answer two research questions: (1) What are the prominent thinking and feelings factors in determining IS continuance intention? (2) How do thinking and feelings lead to IS continuance intention? These questions are answered firstly through a thorough analysis of the relevant literature in IS and related areas to develop a balanced thinking–feelings model of behavior, and subsequently through an empirical application of the model to M-Internet services.

From a theoretical perspective, this study extends our current knowledge on IS continuance intention by examining the balanced effects of thinking and feelings. From a practical perspective, this study provides guidelines on how to retain M-Internet service users. In integrating the thinking and feelings perspectives, the balanced thinking–feelings model identifies the importance of both the cognitive and emotive channels for M-Internet service providers to attract and keep customers.

This paper is organized as follows. The next section presents the theoretical framework, arguing for a balanced

thinking–feelings model, with cognitive and emotional factors affecting attitude and intention. It also presents a systematic theoretical classification of the various emotional factors that have been studied in IS area. The detailed balanced thinking–feelings model (the research model) and hypotheses are then presented in Section 3. In Section 4, we describe our research methodology for an online survey of M-Internet service users. In Sections 5 and 6, we interpret the empirical results and offer theoretical and practical implications. We conclude the paper with a summary of contributions.

2. Theoretical framework

2.1. Previous research on IS continuance

Before developing the theoretical framework in this study, we first review previous research on IS continuance. The review briefly shows how various, mostly cognitive, factors have been added in the studies on IS continuance. The concept of IS continuance has been examined variously as “routinization” (Cooper and Zmud, 1990) and “confirmation” (Rogers, 1995). Despite the variations, studies agree that continuance behavior assumes institutionalizing IS use as a part of normal ongoing activity. Hence, IS continuance behavior may be defined as continued usage of IS by adopters, where a continuance decision follows an initial acceptance decision.

Table 1 summarizes previous research on IS continuance. Parthasarathy and Bhattacharjee (1998) studied a dichotomous division between continuers and discontinuers, with a set of perceptual beliefs. Later studies focus more on the “strength” of continuance. A basic model with only three factors (attitude, subjective norm and voluntariness) to explain IS continuance was proposed by Karahanna et al. (1999). More factors were identified in later studies on continuance. For example, Bhattacharjee (2001) identified usefulness and satisfaction, Kim and Malhotra (2005) added perceived ease of use and usage experience, and Thong et al. (2006) added perceived enjoyment.

Parthasarathy and Bhattacharjee (1998) examined individual characteristics and perceptual beliefs related to IS services that can help differentiate potential discontinuers from continuers in the context of online service. They found that potential discontinuers differ from continuers based on their sources of influence (external and interpersonal), perceived service attributes (usefulness and compatibility), service utilization, and network externality (complementary product usage), during their time of initial adoption. Later studies treat continuance as an interval variable, rather than a categorical two-value variable. This interval treatment of continuance is also adopted in this current study.

Many theories have been used in studying IS continuance. For example, Karahanna et al. (1999) adopts the TPB theory, and found that IS continuance intention was

¹“Emotions” and “feelings” are treated synonymously in this study.

Table 1
Summary of previous research on IS continuance

Research (in chronological order)	Findings
Parthasarathy and Bhattacherjee (1998)	Potential discontinuers can be discriminated from continued adopters based on several perceptual beliefs.
Karahanna et al. (1999)	Continuance intention is influenced by attitude toward using the IT and perceived voluntariness.
Bhattacherjee (2001), Limayem et al. (2003)	Continuance intention is influenced by perceived usefulness and satisfaction based on expectation-confirmation theory.
Kim and Malhotra (2005)	Continuance intention is influenced by perceived usefulness, perceived ease of use and usage experience in previous stage
Thong et al. (2006)	Continuance intention is influenced by perceived usefulness, perceived ease of use, satisfaction and perceived enjoyment.

influenced by two factors, attitude (from TPB) and perceived voluntariness, in the context of using a software package (Windows 3.1). Subjective norm (from TPB) did not show any effect. This study conceptualized attitude from the judgment perspective, as the individual's positive and negative evaluations of performing the behavior. A different theory, the expectation–confirmation theory (Oliver, 1980), was used by Bhattacherjee (2001), who developed the IS continuance model based on cognitive beliefs (usefulness) and overall judgment (satisfaction). The IS continuance model was also applied for the study of IS adoption and post-adoption by Limayem et al. (2003). IS continuance intention was found to be influenced by perceived usefulness and satisfaction.

Based on the TAM, Kim and Malhotra (2005) found that IS continuance intention was influenced by perceived usefulness and perceived ease of use as well as prior usage experience. Thong et al. (2006) extended the expectation-confirmation model with perceived usefulness, perceived ease of use, as well as perceived enjoyment. All factors were found to have significant effects.

As can be seen from the above review, most previous research on IS continuance have focused almost exclusively on cognition-oriented factors. Very few studies have considered emotional factors.

2.2. Thinking- and feeling-based human behavior

People combine desires (e.g., utilities, personal values and goals) and beliefs about objective states, processes and events in the world in their decision making (Hastie, 2001). Such cognitive understandings, collectively known as cognitive orientation (e.g., Kassirjian, 1986), have been the foundation of decision making and human behavior in various disciplines. Examples of cognitive models include TPB in the social psychology area and TAM in the IS area. This single utilitarian viewpoint may be traced to the traditional economic perspective of products as objects, where the consumer desires to optimize utility through tangible attributes such as price. Here, consumers are assumed to be rational and to act according to some reasoning (e.g., information processing model) (Bettman et al., 1991), implying purposive and planned choices. If we restrict our consumption models to largely cognitive

measures, however, only a segment of the effects of situational experiences on behavior could be captured (Belk, 1985).

Contrary to cognition-oriented theories, consumer research (Derbaix and Pham, 1991) and social psychology (Zajonc, 1980) propose that affect plays a more central role in the decision-making process. In this perspective, behavioral sequences generally contain both affective and cognitive components. Pieters and Raaij (1988) suggested that while cognitive activity is needed to make decisions leading to certain goals, affective states may be involved in controlling, interpreting and accompanying the process. In marketing and even economics, researchers (e.g., Holbrook et al., 1990; Kempf, 1999) have emphasized the importance of affect in decision making and cognitive processes. In studies on interaction between users and computer systems (Hudlicka, 2003; Klein et al., 2002; Picard and Klein, 2002), emotional issues are also becoming important. For example, an interface personalized to the user's emotions can increase interaction speed (Kostov and Fukuda, 2001). Indeed, many researchers believe that "everything that people ... do is driven by some kind of feeling" (Grandin and Johnson, 2005, p. 136). In summary, several areas of research have shown the importance of including feelings in studies of human behavior.

According to Romer (2000), a thinking-based mechanism depicts the scenario where a decision maker computes the outcome function for each action using its realization probability before choosing a particular course of action. In contrast, when an individual employs a feeling-based mechanism, he becomes conscious of the hedonic states generated, and chooses an action that offers a higher hedonic state. Following this argument, our study proposes a framework for thinking and feeling-based human behavior, as shown in Fig. 1. Mischel and Shoda (2000) posited that the organization of cognition and affect in a system reflects the individual's total experience.

In the model, cognition is represented by thinking. Affect, represented by feelings, is defined as valenced affective reactions to the emotion-eliciting objects/states being processed by the individual (Dolan, 2002). Feelings and moods are different categories of affect, and differ in the manner in which they arise. Feelings are typically

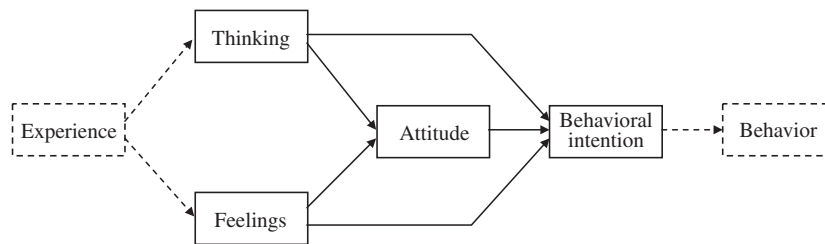


Fig. 1. Theoretical framework for thinking- and feeling-based behavior.

intentional (i.e., feelings have specific referents) (Bagozzi et al., 1999), and are strong affective reactions to the emotion-eliciting objects/states (Dolan, 2002). According to Gardner (1985), there is higher probability for a subject to become aware of his feelings compared to his other affect sub-types. In contrast, mood is the prevalent state of the individual, and does not depend on the stimulus presented by an object. Neither is mood as directly coupled with action tendencies as feelings are (Bagozzi et al., 1999). Because this study is more concerned with the affective reaction specific to the target experience, the feelings rather than mood states of individuals are considered.

Both thinking and feelings would then influence attitude, and all of these affect behavioral intention. Behavioral intention is the most proximal influence on behavior in mediating the effects of other determinants on behavior (Ajzen and Fishbein, 1980).

2.3. Distinction between feelings and attitude

The early conceptualization of attitude was synonymous with affect or affective responses (Davis et al., 1989; Fishbein and Ajzen, 1975; Holbrook, 1986; Venkatesh et al., 2003). To avoid the conceptual and operational ambiguity resulting from treating attitude as affect, Ajzen (2001) redefined attitude as “a summary evaluation of a psychological object” captured in both the functional and hedonic dimensions. Spangenberg et al. (1997) also proposed that attitude, which is evaluative in nature, contains cognitive as well as affective elements, and should be distinguished from affect. Our study adopts this idea of attitude, and reflects the idea in our research model. Many researchers agree that attitude comprises both cognitive and affective elements (Batra and Ahtola, 1990; Petty and Cacioppo, 1985). In contrast, affect pertains only to a general mood, specific emotions or states of feeling (Ajzen, 2001). Thus, attitude highlights summary evaluation while affect emphasizes emotional status.

2.4. Attitude formation from thinking and feelings

Conceptualizing attitudes as having feelings and thinking bases has been a typical means of classifying the different types of information on which attitudes are based. According to the dual process models of attitude change (Wood, 2000), the determinants and processes of attitude

change depend on people’s motivation and ability to process issue-relevant information. Specifically, the Elaboration Likelihood Model (Petty and Cacioppo, 1985) posits that attitude guides decisions and other behaviors, where persuasion is the primary source for attitude formation. The model features two routes of persuasive influence: central and peripheral. The thinking-attitude link acts as the central route involving thoughtful and effortful cognitive processing of relevant information in the message. In addition, individuals need to draw on prior cognitive experience and knowledge to assess and elaborate on the information presented while forming attitude. Such elaboration processes include learning the message content, generating cognitive responses, and performing dissonance-induced reasoning (Wood, 2000); they are in operation where the individual is both motivated and able to process information carefully.

However, in the opposite situation where the individual is not highly motivated and does not have high processing capacity, the individual is more likely to process information that is less complex, such as simple peripheral cues. Thus, the feelings-attitude link can be explained via the peripheral route. Feelings, mood, the effect of mere exposure, and the classical conditioning effect are affective cues leading to persuasion through peripheral route processing. Peripheral cues spontaneously evoke a positive or negative affective response. When the subject is aware of the contingency between the peripheral cue and the target, affect will transfer from the peripheral cue to the target. This subsequently influences evaluative judgment.

2.5. Direct effects of thinking and feelings on behavioral intention

A number of previous studies view cognition as having a direct influence on behavioral intention, implying a direct thinking-behavioral intention linkage. For example, Davis (1989) incorporates the direct effect of beliefs on intention in TAM, which departs from TRA, which shows a complete mediation of attitude between belief and behavioral intention. Bagozzi (1982) also supports the linkage from cognitive perceptions to behavioral intention by hypothesizing that the direct path between them works through stored imperatives in memory. One way of doing so is via the activation of a personal goal by previous thoughts, which in turn influences one’s behavioral intention to act.

Regarding the direct effect of feelings on behavioral intention, the theory of emotion and adaptation (Lazarus, 1991) identifies coping responses as important mechanisms for inferring action and goal attainment from feelings. Depending on the feelings generated, behavioral intentions emerge to activate plans for avoiding undesirable outcomes or increasing/maintaining positive outcomes (Bagozzi, 1992). Bagozzi et al. (1999) went a step further by proposing that action tendencies are automatic, “pre-wired” responses linked to emotions, thus supporting the relationship between emotions and behavioral intention.

2.6. A theoretical classification of emotional factors

Several emotional factors have been studied by prior IS adoption and continuance studies. Among them are enjoyment and anxiety. In IS continuance research, positive affect has been commonly and narrowly conceptualized and measured as the enjoyment which a person derives from using computers (Compeau et al., 1999). Enjoyment has been defined as the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from use (Davis et al., 1992; Thong et al., 2006; Yi and Hwang, 2003; Venkatesh, 2000). For negative affect, the focus has been on computer anxiety. Computer anxiety has been conceptualized as an individual’s apprehension, or even fear, when he is faced with the possibility of using computers (Compeau et al., 1999; Hackbarth et al., 2003; Venkatesh, 2000).

An indirect measurement of emotion is used by Agarwal and Ventakesh (2002), who measured emotion in terms of challenge (capturing the idea of difficulty), plot (related to how the site piques the user’s interest), character strength (related to the credibility conveyed by the site) and pace (the extent to which the site provides users an opportunity to control the flow of information) based on microsoft usability guidelines (MUG). Only the plot measurement item is related to emotion.

Regarding satisfaction, previous IS research (Bhattacharjee, 2001; Limayem et al., 2003) has highlighted the evaluative judgment aspect based on expectation-confirmation theory. The measurement item defining satisfaction (“this web site offers what I expect from a good web site”) asks for a cognitive judgment. Consistent with the evaluative aspect of the concept, previous research (Khalifa and Liu, 2003; De Wulf et al., 2006) attempted to judge overall usage experience. Thus, satisfaction is not a pure affective construct (Kempf, 1999; Mano and Oliver, 1993; Russell, 1980).

Outside IS research, there have been several systematic studies on the content of affect, the dimensions underlying it, and the distinction between types of affect. Russell (1980) proposed three basic emotional states known as *pleasure*, *arousal* and *dominance* (PAD) in the Circumplex Model of Affect. The PAD paradigm has received the greatest attention from consumer researchers for assessing

emotions (Donovan and Rossiter, 1982; Holbrook and Batra, 1987). *Pleasure* and *arousal* are the two primary dimensions of affect because *dominance* requires a cognitive interpretation,² which makes *dominance* unsuitable for representing pure affective responses (Kempf, 1999; Mano and Oliver, 1993; Russell, 1980). Thus, our study identifies *pleasure* and *arousal* as main components of feelings following previous research (Holbrook et al., 1984; Kempf, 1999; Mano and Oliver, 1993; Russell, 1980). *Pleasure* refers to the degree to which a user feels good or happy with the target object while *arousal* refers to the degree to which a user feels excited, stimulated or active. Many previous research have posited that *pleasure* and *arousal* are distinct constructs (e.g., De Wulf et al., 2006; Holbrook et al., 1984; Mano and Oliver, 1993) as well as basic dimensions in classifying emotions (Reisenzein, 1994; Remington et al., 2000; Russell, 1980). Table 2 summarizes emotional constructs which were examined in previous IS research, together with *pleasure* and *arousal*. The opposite ends of *pleasure* and *arousal* are also given in Table 2.

By considering *pleasure* and *arousal* as the two basic components of feelings, previous research (e.g., Remington et al., 2000; Reisenzein, 1994; Russell, 1980) has attempted to classify diverse emotions based on the circumplex model of affect. The circumplex model of affect has two continuous, bipolar, and orthogonal dimensions: the pleasantness–unpleasantness dimension representing *pleasure* and the arousal–quietness dimension representing *arousal*, as illustrated in Fig. 2. Different types of emotions could be mapped onto the different quadrants in the PAD model (Russell, 1980). For example, excitement can be defined as falling in the quadrant with a combination of pleasantness and arousal (Russell, 1980). Excitement’s bipolar opposite, depression, can be defined in the quadrant with a combination of unpleasantness and quietness (Russell, 1980). Calmness can be defined as falling in the quadrant with a combination of pleasantness and quietness (Remington et al., 2000). Calmness’s bi-polar opposite, distress, can be defined in the quadrant with a combination of unpleasantness and arousal (Russell, 1980).

Based on these four quadrants, we can map the constructs from previous IS research to the PAD model. For example, (computer) anxiety has been conceptualized as the feelings of apprehension or fear that one experiences when using computers (Compeau et al., 1999; Venkatesh, 2000). Thus, it can be mapped onto the quadrant characterized by unpleasantness and arousal. Next, enjoyment means the extent to which the activity of using a specific system is perceived to be enjoyable (Davis et al., 1992; Venkatesh, 2000; Yi and Hwang, 2003). Similar to previous research (Russell, 1980; Reisenzein, 1994), enjoyment can be mapped onto the quadrant characterized by

²Similarly, attitude and satisfaction require cognitive interpretations because they highlight the evaluative judgment aspect. Thus, they are not suitable for representing pure affective responses.

Table 2
Summary of previous emotional constructs

Construct	Definition	Measurement items
Affect (focusing mostly on enjoyment) (Compeau et al., 1999)	The enjoyment a person derives from using computers.	<ul style="list-style-type: none"> ● I like working with computers. ● I look forward to those aspects of my job that require me to use a computer. ● Once I start working on the computer, I find it hard to stop. ● Using a computer is frustrating for me (reversed). ● I get bored quickly when working on a computer (reversed).
Anxiety (Compeau et al., 1999; Venkatesh, 2000)	The feelings of apprehension or anxiety that one experiences when using computers.	<ul style="list-style-type: none"> ● I feel apprehensive about using computers. ● It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key. ● I hesitate to use a computer for fear of making mistakes I cannot correct. ● Computers are somewhat intimidating to me.
Enjoyment (Davis et al., 1992; Thong et al., 2006; Venkatesh, 2000; Yi and Hwang, 2003)	The extent to which the activity of using a specific system is perceived to be enjoyable.	<ul style="list-style-type: none"> ● I found using the system to be enjoyable. ● The actual process of using the system is pleasant. ● I have fun using the system.
Pleasure (Holbrook et al., 1984)	The degree to which a user feels good or happy with the target object	<ul style="list-style-type: none"> ● Unhappy–happy ● Annoyed–pleased ● Unsatisfied–satisfied
Arousal (Holbrook et al., 1984)	The degree to which the user feels excited, stimulated or active.	<ul style="list-style-type: none"> ● Calm–excited ● Relaxed–stimulated ● Unaroused–aroused

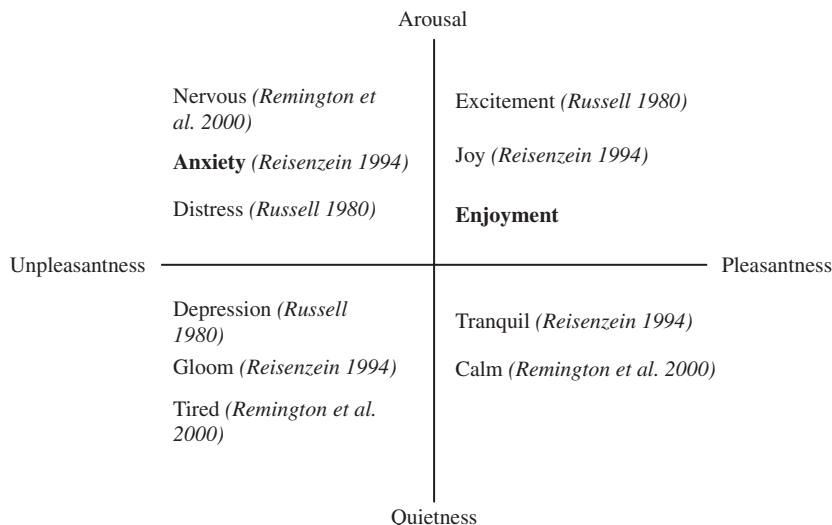


Fig. 2. Mapping emotional constructs onto the PAD model.

arousal and pleasantness. The affect construct as measured by Compeau et al. (1999) focuses mostly on enjoyment.

3. Research model and hypotheses

Based on the theoretical framework in the previous section, we propose our research model in Fig. 3. The model will be applied to the context of M-Internet Services. M-Internet facilitates the provision of a wide spectrum of services anytime, anywhere, and even on-the-go. M-Internet services can be classified into three categories: commerce (e.g., shopping and ticketing), communication (e.g., Yahoo! Chat and mobile email) and contents (e.g., news and games). It is a typical new ICT technology where individuals bear the cost of adoption.

In our study, we also seek to examine attitude toward the use of M-Internet services and its relationship with intention to continue using those services. Following Ajzen (2001), we regard attitude as a summary evaluation of the use of M-Internet services. A customer's overall assessment of the target object is based on a comparison of perceived benefit and perceived sacrifice. This overall assessment then determines the customer's choice or his behavioral intention. Moreover, this attitude–intention relationship is also fundamental to other attitude–behavior theories such as TPB (Ajzen, 1991). Hence, we hypothesize:

H1. Attitude toward the use of M-Internet services is positively related to continuance intention toward the services.

As we discussed earlier, *pleasure* and *arousal* are the two primary components of feelings (Kempf, 1999; Mano and Oliver, 1993; Russell, 1980). In using M-Internet services such as commerce, communication and contents, users may feel pleasure as well as arousal from the services. These feelings could influence attitude according to the Elaboration Likelihood Model, where feelings operate through

peripheral route processing by means of classical conditioning. Previous research (Agarwal and Malhotra, 2005; Allen and Madden, 1985; Allen et al., 2005; Hirschman and Holbrook, 1982) has also shown that affect can influence the formation of attitude in the absence of product beliefs. Therefore, showing attitude formation via direct affect transfer is not a methodological artifact resulting from inappropriate predictors as what some researchers have claimed (Fishbein and Middlestadt, 1995). Hence, we hypothesize:

H2. Pleasure generated from the use of M-Internet services is positively related to attitude toward the use of the services.

H3. Arousal generated from the use of M-Internet services is positively related to attitude toward the use of the services.

Although many studies have established that attitude exerts a strong (but not total) mediating effect on the influence of product-feature knowledge or utilitarian beliefs, it is less known if the same can be said for emotional experience. According to previous research (Lazarus, 1991), feelings can indeed be represented as a direct antecedent of behavioral intention. That is, emotional responses lead either to approach or avoidance behavioral intention. Similar to this, Donovan and Rossiter (1982) found pleasure and arousal as significant predictors of intended shopping behavior. Hence, we hypothesize:

H4. Pleasure generated from the use of M-Internet services is positively related to IS continuance intention toward the services.

H5. Arousal generated from the use of M-Internet services is positively related to IS continuance intention toward the services.

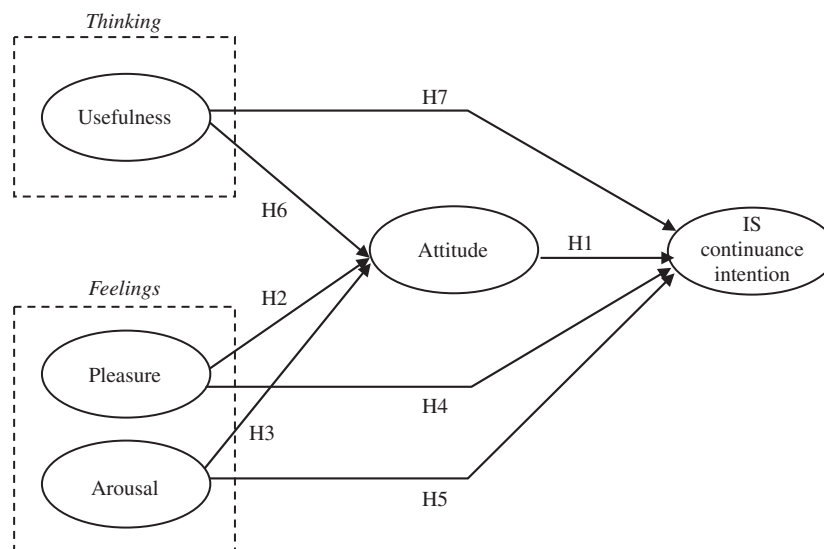


Fig. 3. Balanced thinking–feelings model.

We identify perceived usefulness as the major construct in representing the component of thinking following previous research (Bhattacharjee, 2001; van der Heijden, 2004). Karahanna et al. (1999) noted that perceived usefulness exerts an influence on attitude substantively and consistently in the adoption and post adoption stages of IS use. Moreover, IS service users would seek to reap benefits from useful M-Internet services to make the consumption experience worthwhile. In contrast, while other factors such as ease of use or usage fee may influence the initial adoption decision of M-Internet service users (Kim et al., 2007), they may play less critical roles in deciding continued usage and post-adoption behavior toward M-Internet services (Bhattacharjee and Premkumar, 2004). Accordingly, this study proposes only one cognitive factor, perceived usefulness.

Perceived usefulness means the degree to which a person believes that using a particular system would be advantageous to performing his task (Davis, 1989; Davis et al., 1989). In our study, task means an objective or a function to be performed using the M-Internet, such as checking emails, reserving concert tickets and getting lottery results. If a technology performs effectively, provides gains over alternative services, and helps IS service consumers in difficult situations (i.e., it is useful), consumers are likely to evaluate the use of the technology favorably. Because usefulness is part of perceived benefit, it may have a positive effect on attitude. Hence, we hypothesize:

H6. Perceived usefulness of M-Internet services is positively related to attitude toward use of the services.

Similar to the persistent impact of attitude across the adoption and post adoption stages, perceived usefulness is often found to directly influence behavioral intention consistently over time (Bhattacharjee and Premkumar, 2004; Kim and Malhotra, 2005; Limayem et al., 2003). Intentions toward means-end behavior are based largely on cognitive decision rules to improve performance (Davis et al., 1989). Following this line of reasoning, if an individual believes that continuing to use a technology would help in attaining certain goals (i.e., the technology is useful), then he would have the intention to carry on using it. Hence, we hypothesize:

H7. Perceived usefulness of M-Internet services is positively related to continuance intention toward the services.

4. Research methodology

4.1. Instrument development

We adopted existing validated scales and empirical procedures wherever possible. To measure continuance intention, we followed the scale guidelines of TRA and ensured that the questions were specific and consistent with respect to action (continuance), target (M-Internet services), context (individual purpose), and time (within the next 6

months). We adapted the IS continuance intention scales from Bhattacharjee (2001). For attitude, we adopted the items from Ajzen (2001), excluding two items (i.e., beneficial and valuable) which overlap with usefulness. We adapted the scale of usefulness from Davis et al. (1989) and Parthasarathy and Bhattacharjee (1998). To measure pleasure and arousal, we selected the pleasure and arousal items that best suited the M-Internet service context from Holbrook et al. (1984). The measurements used a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree).

We conducted a series of pre-tests to examine and validate the survey instrument. Before data collection, three IS researchers reviewed the instrument and checked its face validity. In addition, the questionnaire was discussed in focus groups of 10 experienced M-Internet service users. Subsequently, we made some changes concerning the format and wording of the questions. Next, in a pilot test, we sent the questionnaire to 72 students. Reliability and validity of the instrument were checked based on the responses. The results suggested that the instrument possess adequate reliability and validity. The final version is shown in Table 3.

4.2. Data collection

We collected empirical data for this study via an Internet survey over 2 weeks. We posted messages advertising the survey at public forums. At the same time, we emailed via the university emailing list to all undergraduates and graduates, inviting any experienced M-Internet service users to take part in the survey. To improve the response rate, an incentive of \$50 was offered to 20 respondents by random draw. Potential respondents were reminded not to take the survey if they had no experience in using M-Internet services. The respondents were requested to enter their mobile phone number for accessing M-Internet services, so that we could check if they had M-Internet service experience. We also assured the confidentiality of responses.

The survey attracted a total of 272 users. However, multiple responses from the same respondents (16 cases) were discarded. Cases where the respondent had overlooked the reverse order occurring among the continuance intention items were rejected (38 cases). As a result, 218 valid responses were left. Table 4 shows the demographics of the respondents. About 74 percent of the respondents were male. The respondents were also relatively young, with about 89 percent being 20–30 years old (mean = 23.9, s.d. = 3.9). About half of the respondents used M-Internet services for one to five times per month (mean = 13.1; s.d. = 17.0). Comparing the usage patterns of the three categories of M-Internet services, we found that contents and commerce services were more frequently used than communication services. In terms of profession, about 73.8 percent of the respondents were university students. This was to be expected as the university emailing list was used. The next largest group of participants was working professionals, accounting for 22.7 percent of the sample.

Table 3
Measurement instrument

Construct	Item	Wording	Reference
IS continuance intention	INT1	I intend to continue using mobile Internet services in the next six months	Bhattacharjee, 2001
	INT2	During the next six months, I plan to continue using mobile Internet services	
	INT3	I expect to continue using mobile Internet services in the next six months	
	INT4	If I could, I would like to discontinue my use of mobile Internet services (reverse)	
Attitude	“How would you rate the use of mobile Internet services?”		Ajzen, 2001
	ATT1	Bad–good	
	ATT2	Dislikeable–likeable	
Usefulness	USF1	Using mobile Internet services enables me to accomplish tasks more quickly	Davis et al., 1989
	USF2	Using mobile Internet services makes it easier to do my task	
	USF3	Using mobile Internet services saves me time and effort in performing tasks	
	USF4	Mobile Internet services are useful to me in performing my tasks	
Pleasure	“Using mobile Internet services makes me feel”		Holbrook et al., 1984
	PLE1	Unhappy–happy	
	PLE2	Annoyed–pleased	
	PLE3	Unsatisfied–satisfied	
Arousal	“Using mobile Internet services makes me feel”		
	ARO1	Calm–excited	
	ARO2	Relaxed–stimulated	
	ARO3	Unaroused–aroused	

Table 4
Respondent characteristics

Measure	Value	Frequency	Percentage
Gender	Male	162	74.3
	Female	56	25.7
Age	<20	8	3.6
	20–29	187	85.8
	30–39	22	10.1
	>40	1	0.5
Usage per month	1–5	111	50.9
	6–10	42	19.3
	11–15	11	5.0
	16–20	18	8.3
	>21	36	16.5
M-Internet service*	Communications	54	24.8
	Contents	77	35.3
	Commerce	87	39.9
Profession	High school	2	0.9
	Undergraduate	145	66.5
	Graduate	16	7.3
	Professional	50	22.9
	Self-employed	1	0.5
	Others	4	1.9
Total		218	100.0

*Most frequently used.

We assessed non-response bias by verifying that early and late respondents, i.e., those who replied before or after the first week, were not significantly different, following the procedure suggested by Armstrong and Overton (1997).

We compared the two groups based on their sample attributes (gender, age, usage per month, M-Internet service, and profession), and found no significant difference between them. Next, we verified that the respondent demographics were consistent with current M-Internet service users. A report by the Electronic Commerce Promotion Council (ECOM, 2002) shows that the users of M-Internet services are mainly individuals in their 20s and early 30s. For this reason, it is acceptable to have a larger percentage of respondents in their 20s in our study.

5. Data analysis and results

We conducted data analysis in accordance with a two-stage methodology (Anderson and Gerbing, 1988a) using LISREL. LISREL is suitable statistical technique for this study as it allows us to test the proposed model with various constraints (Gefen et al., 2000). The first step in the data analysis was to establish the convergent and discriminant validity of the constructs. In the second step, we examined the structural model based on the cleansed measurement model.

5.1. Confirmatory factor analysis

To test convergent validity, we first check the unidimensionality of each construct. Following recommended methodological procedures (Anderson and Gerbing,

1988b; Gefen et al., 2000), we set out to revise the measurement model by dropping, one at a time, measurement items which shared a high degree of residual variance with other items. The second item of perceived usefulness, USF2, was dropped because this item shared a high degree of residual variance with USF1 and USF3.

Convergent validity was additionally assessed using three criteria. First, standardized path loadings should be greater than 0.7 and statistically significant (Gefen et al., 2000). Second, the composite reliability (CR) and the Cronbach's α for each construct must be larger than 0.7 (Hair et al., 1998). Third, the average variance extracted (AVE) for each factor should exceed 0.5 (Fornell and Larcker, 1981).

As depicted in Table 5, the standardized path loadings were all significant (t -value > 1.96) and greater than 0.7 except for INT4 (0.63). The CR and the Cronbach's α for all constructs exceeded 0.7. The AVE for each factor was greater than 0.5. Hence, the convergent validity for the constructs was supported.

Next, we assessed discriminant validity of the measurement model by comparing the AVE for each construct with the squared correlations between that construct and other constructs (Fornell and Larcker, 1981). As shown in Table 6, the AVE for each construct exceeded the squared

correlations between that construct and other constructs, which indicates discriminant validity. Discriminant validity was also assessed using a process of constrained confirmatory factor analysis as suggested by Anderson and Gerbing (1988a). For every pair of constructs, we tested the fit of a free model with all items loaded on the intended construct, and the fit of a constraint model with all items for each pair loading on a single factor. If the model fit degenerated significantly then the discriminant validity was considered satisfactory. Using this process, all χ^2 differences between every pair of constructs were significant and each original model had a better model fit compared to its corresponding constrained model, indicating that the measurement model was significantly better than other alternative models. Hence, discriminant validity was established.

5.2. Hypothesis testing

We examined the structural model based on the cleansed measurement model. The normed χ^2 (χ^2 to degree of freedom) was 1.26, which was good, being below the maximum desired cut-off of 3.0 (Gefen et al., 2000). Root mean square error of approximation (RMSEA) was 0.034, indicating a good fit, being below the maximum desired cut-off of 0.06 (Gefen et al., 2000). Root mean-square residual (RMR) was 0.044, slightly lower than the desired maximum cut-off of 0.05 (Hair et al., 1998). Goodness-of-fit index (GFI) was 0.94 and adjusted goodness-of-fit index (AGFI) was 0.91, both of which were above the recommended threshold of 0.9 and 0.8 (Gefen et al., 2000). The other fit indices were all above the recommended threshold of 0.9 (Gefen et al., 2000): comparative fit index (CFI) = 0.99 and normed fit index (NFI) = 0.98. These results suggest that the structural model fitted the data adequately.

Fig. 4 shows the standardized LISREL path coefficients and the overall fit indices. All the paths were significant except for that between arousal and IS continuance intention. Supporting H2, H3, and H6, pleasure (0.33, $p < 0.001$), arousal (0.14, $p < 0.01$) and usefulness (0.39, $p < 0.001$), respectively, had significant effects on attitude, explaining 63 percent of the variance. Supporting H1, H4, and H7, attitude (0.52, $p < 0.001$), pleasure (0.24, $p < 0.05$) and usefulness (0.21, $p < 0.05$), respectively, had significant

Table 5
Results of convergent validity testing

Items	Std. loading	t -value	AVE	CR	Cronbach's α
INT1	0.93	17.95			
INT2	0.95	18.77			
INT3	0.92	17.55	0.75	0.92	0.91
INT4	0.63	10.14			
ATT1	0.85	15.07			
ATT2	0.85	15.15	0.72	0.83	0.86
USF1	0.87	17.30			
USF3	0.89	15.43	0.76	0.90	0.91
USF4	0.87	15.99			
PLE1	0.87	17.35			
PLE2	0.91	15.68	0.77	0.91	0.91
PLE3	0.86	16.33			
ARO1	0.86	15.46			
ARO2	0.86	15.45	0.78	0.91	0.91
ARO3	0.93	17.95			

Table 6
Correlations between latent variables

	Mean (s.d.)	Continuance intention	Attitude	Usefulness	Pleasure	Arousal
Continuance intention	5.32 (1.29)	0.84				
Attitude	5.27 (1.21)	0.58	0.85			
Usefulness	4.84 (1.11)	0.54	0.53	0.89		
Pleasure	5.03 (1.21)	0.55	0.63	0.34	0.91	
Arousal	4.60 (1.33)	0.44	0.46	0.38	0.55	0.91

Note: Leading diagonal shows the square root of AVE of each variable.

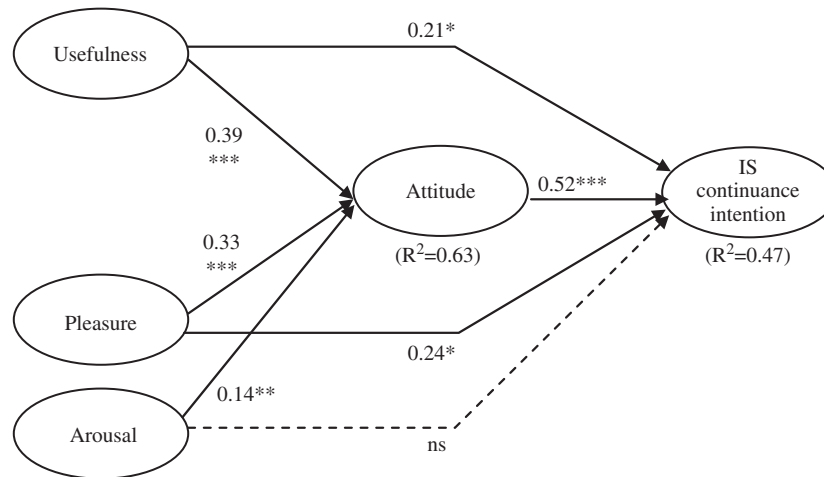


Fig. 4. Standardized LISREL solution. $\chi^2 = 102.5$, $df = 81$, $GFI = 0.94$, $AGFI = 0.91$, $CFI = 0.99$, $RMSEA = 0.034$, $Std. RMR = 0.044$ (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns: insignificant at the 0.05 level).

effects on IS continuance intention, explaining 47 percent of the variance. For H5, arousal had no significant effect on IS continuance intention. In summary, all hypotheses except H5 were supported.

6. Discussion

6.1. Discussion of findings

We have found that both the thinking-based and feeling-based mechanisms work together to shape attitude, an overall evaluation of the use of M-Internet services. As noted by van der Heijden (2002), the presence of one set of mechanism does not exclude the other in attitude formation. In addition, the results show that both primary dimensions of feelings, pleasure and arousal, influence attitude formation in IS continuance. This finding is consistent with prior research in marketing (Allen and Madden, 1985; Kempf, 1999; Hirschman and Holbrook, 1982) and sociology (Schwarz and Clore, 1988).

We have also found that both the thinking- and feeling-based mechanisms work together to determine IS continuance intention. The direct effect of feelings on behavioral intention can be further discussed using the idea of intrinsic motivation. Intrinsic motivation refers to the performance of an activity for no other reason than the performing process (Deci, 1971). The hedonic benefits which are derived from the use of M-Internet services could be considered intrinsic motivation. Therefore, all preferable feelings (e.g., pleasure, playfulness, enjoyment) can be considered as intrinsic motivation. Enjoyment, which has been commonly studied in IS adoption, has been classified as a type of intrinsic motivation (Yi and Hwang, 2003). Our study shows that pleasure, as a pure affective response, could lead users to continuance intention. Although some researchers may consider such feeling-based behavior as irrational (Pieters and Raaij, 1988), users do regard their emotional experience as very relevant in making decisions

(Hirschman and Holbrook, 1982). However, arousal does not appear to have a direct impact on continuance intention.

It is interesting to further discuss whether there is any difference in the impacts on IS continuance intention between the thinking factor (usefulness) and feeling factor (pleasure). If there is a difference, IS vendors (e.g., M-Internet service providers) have to put different weights on the factors accordingly. As a post hoc analysis, we found that usefulness alone (path coefficient = 0.71, $t = 9.22$) explained 40 percent of the variance of continuance intention, and pleasure alone (path coefficient = 0.79, $t = 9.24$) explained 36 percent of the variance of continuance intention. To further compare the coefficients of two paths within the same structural model, we carried out a two-step constraint approach (Byrne, 1998). First, a base model with all the hypothesized paths was created using LISREL and estimated. Second, equality constraint was imposed for the two paths to be compared (i.e., the path from usefulness to continuance intention and the path from pleasure to continuance intention). If the constrained model had a significantly lower fit (in terms of χ^2) compared to the base model, then the coefficients of the two paths would be significantly different. The testing results revealed that the change in model fit was very small and insignificant ($\Delta\chi^2 = 0.09$, $p > 0.1$). Hence, the coefficient of the path from usefulness to continuance intention was not significantly different from the coefficient of the path from pleasure to continuance intention, which explains the balanced effects of usefulness as belief and pleasure as feeling on continuance intention. Therefore, IS vendors have to put equal weights on the thinking and feeling factors to retain their service users.

However, we have to note the difference between this study and other technology adoption or continuance studies. Much of the research (Davis, 1989; Davis et al., 1989; Karahanna et al., 1999; Venkatesh et al., 2003) on technology adoption or continuance has been in organizational settings, and the

selected technologies have been functional products devoid of the hedonic dimension. Moreover, employees as users are mainly concerned about using a system to aid them in work-related issues. At the other extreme, Hsu and Lu (2004) and van der Heijden (2004) consider purely hedonic applications. In comparison, our study is set in an individual setting where users play the dual role of service consumer and technology user employing IS services for personal needs that are both utilitarian and hedonic. From the consumption perspective (Holbrook, 1986), the IS service consumption experience comprises both affective and cognitive dimensions. For this reason, not only the utilitarian dimension but also the hedonic dimension becomes important for overall evaluation (attitude in this study) and the continuance decision.

6.2. Limitations and future research

The findings are subject to the following limitations. First, the use of an Internet survey has limited this study to a pool of Internet users who visited the public forums where we advertised our survey for a period of 2 weeks and to those who were listed in the emailing list that we obtained. Second, 86 percent of respondents were in their 20s, and 74 percent of them were undergraduate and graduate students. While students in their 20s are the main users of M-Internet services, future research could consider samples in different age groups and with different jobs to obtain a more complete picture of users. Third, our study is about users of M-Internet services. The research needs to be replicated to examine the robustness of the research model and findings across different contexts. Fourth, we have sought to measure emotional responses. Donovan and Rossiter (1982) noted that emotional responses are not always recallable. Thus, answering feeling-related questions using a questionnaire may not always yield accurate results. We suggest that future research could consider using an experimental design to check for the effect of feelings toward the use of M-Internet services on attitude and continuance intention toward the services. This would allow emotional responses to be captured as soon as they are experienced, minimizing the distortion posed by time on the recall of feelings. Fifth, we have not considered the relationships between the thinking factor and the feelings factor, even though there are two streams of study on them, i.e., primacy of affect (Zajonc, 1980) and primacy of cognition (Lazarus, 1991). Future studies may need to test the relationships between thinking and feelings.

6.3. Implications

This study has developed and validated a balanced thinking-based and feeling-based theoretical model for explaining attitude and human behavioral intention. As argued in the introduction section, continued usage of new IS for personal purposes by individuals is better explained by the thinking–feelings model. This is because consumer choice and usage behavior are based on cognition and affective responses to a stimulus or experience (Oliver, 1997). To that end, we have established attitude and balanced thinking and feelings as important antecedents of behavioral intention. This study represents an important theoretical step forward from prior research on IT adoption (e.g., Davis et al., 1989; Venkatesh et al., 2003) and IS continuance (e.g., Bhattacharjee, 2001; Kim and Malhotra, 2005), by utilizing the two basic dimensions of feelings rather than an ad hoc selection of an emotion.

This study also highlights a roughly equal impact from thinking and feelings. However, researchers have argued that the relative importance may depend on the application or environment (e.g., van der Heijden, 2004). It is argued that in certain applications such as games, the feelings components will have much bigger effects than the thinking component, while in an organizational office environment, the thinking component may be more important. In this study, the M-Internet service users exhibit equal effects from both thinking and feelings factors. Future theoretical development can consider more explicitly factors that may moderate the effects of feelings and thinking, or more clearly define the boundaries that the models are applicable.

From the practical perspective, this research has provided evidence concerning the thinking and feelings criteria that adopters utilize to evaluate whether to continue IS usage. Our results show that users are responsive to the usefulness of IS services and to their own feelings toward the services. Table 7 suggests some possible methods to enhance thinking and feelings of IS users. Users can be kept in a loop of services if they perceive the services to be useful, and they can be encouraged in this perception if system design could focus on user needs and desires in ways that are not possible in typical e-commerce. In so doing, habitual behavior (Limayem et al., 2003) in using the target services may be inculcated. One of the ways to achieve the provision of useful and feel-good IS services is to take advantage of the

Table 7
Methods to enhance positive thinking and feelings

	Thinking	Feelings
Methods	<ul style="list-style-type: none"> ● Enhancing functional usefulness of IS (e.g., ubiquity). ● Designing IS focusing on user's needs and desires. ● Utility maximization (e.g., benefits in comparison with cost). 	<ul style="list-style-type: none"> ● Offering interactive and multimedia interfaces which enhance feelings (e.g., pleasure). ● Advertising the emotional aspects (e.g., peace of mind). ● Providing new services considering the emotional aspect.

unique characteristics of the particular technology, such as the time- and location-specific characteristics of M-Internet services (Dholakia and Dholakia, 2004). In addition, most users use new technologies such as M-Internet services for personal purposes, the value of service in comparison with service charge would be important.

In addition to improving instrumental consumption experience, service providers should take care of consumers' emotional experience. Hudlicka (2003) noted that IT systems can behave in a way that appears to reflect a particular affective state, which may induce affective reactions in the human user. As feelings are significant in predicting attitude and continuance intention, service providers should offer services and interfaces that enhance feelings of pleasure and arousal. Many companies are already emphasizing emotions as a means to sell M-Internet products and services. For example, it is quite common to see advertisements of mobile phone systems that include heavy emotional elements, such as showing people calling their loved ones on the phone, rather than highlighting the utilitarian value of getting the information across. In the marketing of global positioning system (GPS) phones and watches, it is also common to emphasize the emotional aspects, such as the safety and peace of mind that people can have through the ability to locate their loved ones (e.g., www.wherify.com). Similarly, even in the marketing of phone communication services, emphasis is often on the emotional aspect, e.g., the ability to “wish happy birthday to a loved one” (www.bell.ca). Companies providing new services could thus consider the emotional aspect to increase customer adoption and continuing usage.

7. Conclusion

The literature review has shown the need to consider a richer consumption experience in explaining continuance intention toward M-Internet services by individual users. It is known that affect as well as cognition produce important effects on service consumption and continuance (Holbrook and Hirschman, 1982). We have developed a theoretical framework for explaining the intention of human behavior (IS continuance) based on a combined thinking and feelings perspective. The results confirmed the validity of the model. We have also shown the balanced effects from thinking and feelings on IS continuance intention in the M-Internet service context. The findings of this study form an important contribution toward articulating differences in the effects of cognition and affect on IS continuance.

Future research could apply the balanced thinking–feelings model in other areas of study, such as e-commerce and non-IS related behavior. Although in this study, we have focused on IS continuance behavioral intention, the value of the model lies in its ability to allow the prediction and understanding of behavior in an experience-based context. Applying this framework to other areas of study could lead to more comprehensive understandings of human behavior.

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References

- Agarwal, J., Malhotra, N.K., 2005. An integrated model of attitude and affect: theoretical foundation and an empirical investigation. *Journal of Business Research* 58 (4), 483–493.
- Agarwal, R., Ventakesh, V., 2002. Assessing a Firm's Web Presence: a heuristic evaluation procedure for the measurement of usability. *Information Systems Research* 13 (2), 168–186.
- Ajzen, I., Fishbein, M., 1980. *Understanding attitudes and predicting social behavior*. Prentice-Hall, Englewood Cliffs, NJ.
- Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50, 179–211.
- Ajzen, I., 2001. Nature and operation of attitudes. *Annual Review on Psychology* 52, 27–58.
- Anderson, J.C., Gerbing, D.W., 1988a. Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* 103 (3), 411–423.
- Anderson, J.C., Gerbing, D.W., 1988b. An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research* 25, 186–192.
- Allen, C.T., Madden, T.J., 1985. A closer look at classical conditioning. *Journal of Consumer Research* 12, 301–315.
- Allen, C.T., Machleit, K.A., Klein, S.S., Notani, A.S., 2005. A place for emotion in attitude models. *Journal of Business Research* 58 (4), 494–499.
- Armstrong, J.S., Overton, T.S., 1997. Estimating nonresponse bias in mail surveys. *Journal of Marketing Research* 14, 396–402.
- Bagozzi, R.P., 1982. A field investigation of causal relations among cognitions, affect, intentions, and behavior. *Journal of Marketing Research* 19, 562–584.
- Bagozzi, R.P., 1992. The self-regulation of attitudes, intentions, and behavior. *Social Psychology Quarterly* 55 (2), 178–204.
- Bagozzi, R.P., Gopinath, M., Nyer, P., 1999. The role of emotions in marketing. *Journal of the Academy of Marketing Science* 27 (2), 184–206.
- Batra, R., Ahtola, O.T., 1990. Measuring the hedonic and utilitarian sources of consumer attitudes. *Marketing Letters* 2 (2), 159–170.
- Belk, R.W., 1985. Issues in the intention–behavior discrepancy. *Research in Consumer Behavior* 1, 1–34.
- Bettman, J.R., Johnson, E.J., Payne, J.W., 1991. Consumer decision making. In: T.S. Robertson, T.S., Kassarjian, H.H. (Eds.), *Handbooks of Consumer Theory and Research*. Prentice-Hall, Englewood Cliffs, NJ, pp. 50–84.
- Bhattacharjee, A., 2001. Understanding information systems continuance: an expectation–confirmation model. *MIS Quarterly* 25 (3), 351–370.
- Bhattacharjee, A., Premkumar, G., 2004. Understanding changes in belief and attitude toward information technology usage: a theoretical model and longitudinal test. *MIS Quarterly* 28 (2), 229–254.
- Byrne, M.B., 1998. *Structural Equation Modeling with LISREL, PRELIS, and SIMPLS: Basic Concepts, Applications, and Programming*. Lawrence Erlbaum Associates, Mahwah, NJ.
- Compeau, D., Higgins, C.A., Huff, S., 1999. Social cognitive theory and individual reactions to computer technology: a longitudinal study. *MIS Quarterly* 23 (2), 145–158.
- Cooper, R.B., Zmud, R.W., 1990. Information technology implementation research: a technological diffusion approach. *Management Science* 36 (2), 123–139.
- Davis, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13 (3), 319–340.
- Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science* 35 (8), 982–1002.

- Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1992. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology* 22 (14), 1111–1132.
- De Wulf, K., Schillewaert, N., Muylle, S., Rangarajan, D., 2006. The role of pleasure in web site success. *Information and Management* 43 (4), 434–446.
- Deci, E.L., 1971. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology* 18, 105–115.
- Derbaix, C., Pham, M.T., 1991. Affective reactions to consumption situations: a pilot investigation. *Journal of Economic Psychology* 12, 325–355.
- Dholakia, R.R., Dholakia, N., 2004. Mobility and markets: emerging outlines of m-commerce. *Journal of Business Research* 57, 1391–1396.
- Dolan, R.J., 2002. Emotion, cognition and behavior. *Science* 298, 1191–1194.
- Donovan, R.J., Rossiter, J.R., 1982. Store atmosphere: an environmental psychology approach. *Journal of Retailing* 58 (1), 34–57.
- Electronic Commerce Promotion Council (ECOM), 2002. Mobile EC in Japan and User Awareness. <http://www.ecom.jp/ecom_e/press/press20020301.htm>.
- Fishbein, M., Ajzen, I., 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley, Reading, MA.
- Fishbein, M., Middlestadt, S., 1995. Noncognitive effects on attitude formation and change: fact or artifact? *Journal of Consumer Psychology* 4 (2), 181–202.
- Fornell, C., Larcker, D., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18, 39–50.
- Gardner, M.P., 1985. Mood states and consumer behavior: a critical review. *Journal of Consumer Research* 12, 281–300.
- Gefen, D., Straub, D.W., Boudreau, M., 2000. Structural equation modeling techniques and regression: guidelines for research practice. *Communications of AIS* 4 (7), 2–76.
- Grandin, T., Johnson, C., 2005. *Animals in translation, using the mysteries of autism to decode animal behavior*. Scribner, New York, NY.
- Hackbarth, G., Grover, V., Yi, M., 2003. Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use. *Information & Use* 40, 221–232.
- Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C., 1998. *Multivariate Data Analysis*, sixth ed. Prentice-Hall, Englewood Cliffs, NJ.
- Hastie, R., 2001. Problems for judgment and decision making. *Annual Review of Psychology* 52, 653–683.
- Hirschman, E.C., Holbrook, M.B., 1982. Hedonic consumption: emerging concepts, methods and propositions. *Journal of Marketing* 46, 92–101.
- Holbrook, M.B., 1986. Emotion in the consumption experience: toward a new model of the human consumer. In: Peterson, R.A., Hoyer, W.D., Wilson, W.R. (Eds.), *The Role of Affect in Consumer Behavior*. Health, Lexington, MA, pp. 17–52.
- Holbrook, M.B., O'Shaughnessy, J., Bell, S., 1990. Actions and reactions in the consumption experience: the complementary roles of reasons and emotions in consumer behavior. *Research in Consumer Behavior* 4, 131–163.
- Holbrook, M.B., Batra, R., 1987. Assessing the role of emotions as mediators of consumer responses to advertising. *Journal of Consumer Research* 14, 404–420.
- Holbrook, M.B., Chestnut, R.W., Oliva, T.A., Greenleaf, E.A., 1984. Play as a consumption experience: the roles of emotions, performance, and personality in the enjoyment of games. *Journal of Consumer Research* 11, 728–739.
- Holbrook, M.B., Hirschman, E.C., 1982. The experiential aspects of consumption: consumer fantasies, feelings and fun. *Journal of Consumer Research* 9, 132–140.
- Hsu, C., Lu, H., 2004. Why do people play on-line games? An extended TAM with social influences and flow experience. *Information and Management* 41, 853–868.
- Hudlicka, E., 2003. To feel or not to feel: the role of affect in human-computer interaction. *International Journal of Human-Computer Studies* 59, 1–32.
- Karahanna, E., Straub, D.W., Chervany, N.L., 1999. Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly* 23 (2), 183–213.
- Kassarjian, H.H., 1986. Consumer research: some recollection and a commentary. In: Lutz, R.J. (Ed.), *Advances in Consumer Research*, vol. 13. Association for Consumer Research, Provo, UT, pp. 6–8.
- Kempf, D.S., 1999. Attitude formation from product trial: distinct roles of cognition and affect for hedonic and functional products. *Psychology and Marketing* 16 (1), 35–50.
- Khalifa, M., Liu, V., 2003. Determinants of satisfaction at different adoption stages of internet-based services. *Journal of the Association for Information Systems* 4 (5), 206–232.
- Kim, H.W., Chan, H.C., Gupta, S., 2007. Value-based Adoption of Mobile Internet: an empirical investigation. *Decision Support Systems* 43 (1), 1–16.
- 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.
- Klein, J., Moon, Y., Picard, R.W., 2002. This computer responds to user frustration: theory, design, and results. *Interacting with Computers* 14 (2), 119–140.
- Kostov, V., Fukuda, S., 2001. Development of man-machine interfaces based on user preferences. *Proceedings of the 2001 IEEE International Conference on Control Applications*, 1124–1128.
- Lazarus, R.S., 1991. *Emotion and Adaptation*. Oxford University Press, New York.
- Limayem, M., Cheung, M.K., Chan, W.W., 2003. Explaining information systems adoption and post-adoption: toward an integrative model. *International Conference on Information Systems*, Seattle US.
- Mano, H., Oliver, R.L., 1993. Assessing the dimensionality and structure of the consumption experience: evaluation, feeling, and satisfaction. *Journal of Consumer Research* 20, 451–466.
- Mischel, W., Shoda, Y., 2000. A cognitive-affective system theory of personality: reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. In: Tory Higgins, E., Kruglanski, A.W. (Eds.), *Motivational Science: Social and Personality Perspectives*. Philadelphia PA Press, pp. 150–176.
- Oliver, R.L., 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research* 17, 460–469.
- Oliver, R.L., 1993. Cognitive, affective, and attribute bases of satisfaction response. *Journal of Consumer Research* 20 (3), 418–430.
- Oliver, R.L., 1997. *Satisfaction: A Behavioral Perspective on the Consumer*. McGraw-Hill, New York.
- Parthasarathy, M., Bhattacharjee, A., 1998. Understanding post-adoption behavior in the context of online service. *Information Systems Research* 9 (4), 362–379.
- Petty, R.E., Cacioppo, J.T., 1985. *Attitude and Persuasion: Classic and Contemporary Approaches*. WCB, Debuque, IA.
- Picard, R.W., Klein, J., 2002. Computers that recognize and respond to user emotion: theoretical and practical implications. *Interacting with Computers* 14 (2), 141–169.
- Pieters, R.G.M., Raaij, W.F., 1988. Functions and management of affect: applications to economic behavior. *Journal of Economic Psychology* 9, 251–282.
- Reisenzein, R., 1994. Pleasure-arousal theory and the intensity of emotions. *Journal of Personality and Social Psychology* 67 (3), 525–539.
- Remington, N.A., Visser, P.S., Fabrigar, L.R., 2000. Reexamining the circumplex model of affect. *Journal of Personality and Social Psychology* 79 (2), 286–300.
- Rogers, E.M., 1995. *Diffusion of innovations*, 4th Edition. Free Press, New York.
- Romer, P.M., 2000. Thinking and feeling. *The American Economic Review* 90 (2), 439–443.

- Russell, J.A., 1980. A circumplex model of affect. *Journal of Personality and Social Psychology* 39, 1160–1178.
- Schwarz, N., Clore, G.L., 1988. How do I feel about it? informative functions of affective states. In: Klaus, F., Joseph, F. (Eds.), *Affect, Cognition, and Social Behavior*. Hofgreffe International, Toronto, pp. 44–62.
- Spangenberg, E.R., Voss, K.E., Crowley, A.E., 1997. Measuring the hedonic and utilitarian dimensions of attitudes: a generally applicable scale. *Advances in Consumer Research* 24, 235–241.
- 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.
- Van der Heijden, H., 2002. On the cognitive-affective structure of attitudes toward information systems. *Twenty-Third International Conference on Information Systems* 803–806.
- Van der Heijden, H., 2004. User acceptance of hedonic information systems. *MIS Quarterly* 28 (4), 695–704.
- Venkatesh, V., 2000. Determinants of perceived ease of use: integrating control, intrinsic motivation and emotion into the technology acceptance model. *Information Systems Research* 11 (4), 342–365.
- Venkatesh, V., Morris, M., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: towards a unified view. *MIS Quarterly* 27 (3), 425–478.
- Wood, W., 2000. Attitude change: persuasion and social influence. *Annual Review of Psychology* 51, 539–570.
- Yi, M., Hwang, Y., 2003. Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies* 59, 431–449.
- Zajonc, R.B., 1980. Feeling and thinking: preferences need no inferences. *American Psychologist* 35 (2), 151–175.