



Continuous usage intention of Internet banking: a commitment-trust model

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Abstract With the rapid explosion of the online technology, Internet Banking (IB) has been prevalent in recent years and attracts much research attention. Although intensive studies have investigated the determinants of users' initial acceptance of IB service, much less research has further explored the continuous usage of IB service. This study focuses on the continuous IB service usage intention by examining the role of users' psychological cognition (e.g., trust and commitment) in improving their continuous usage intention of IB service. Integrating the commitment-trust theory and the unified theory of acceptance and use of technology, we argue that besides contributive effects to continuous usage intention, psychological cognition mediates the influences of usage experiences (e.g., perceived service value, quality of alternatives, and anxiety) on continuous usage intention. This model was tested using survey data from 173 non-traditional college students who were all full-time employees with several years of working experience. The results confirm the contributive and mediating effects of trust and commitment on continuous IB service usage intention. The study contributes to the literature by highlighting the role of trust and commitment in predicting IB service continuous usage, and the findings provide useful implications for bank management in retaining online customers.

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1 Introduction

With the rapid explosion of the Internet technology, Internet Banking (IB), or online banking, has been an increasingly important alternative channel to provide banking services and products. As Shih and Fang (2006) explained, IB is a new type of personal computer-based information system that can enable customers to perform various financial activities (e.g., online shopping and Internet stock trading) in virtual space. Compared with traditional branch banks, IB greatly increases the number of accounts and the overall balance, which could help offset the impact of high-cost service, thus contributing to the significantly higher net value of customers to financial institutions (Witman and Roust 2008). From the perspective of users, they can benefit from lower online bank charges, higher speed, more convenience, and round-the-clock availability of IB services (Cheng et al. 2006). Given its advantages, IB has been widely provided by many banks and has been used by an increasing number of customers. Its adoption and usage have also been studied extensively.

Despite intensive studies conducted to examine the initial adoption, or acceptance, of IB service (Alwan and Al-Zubi 2016; Boateng et al. 2016; Cheng et al. 2006; Eriksson and Nilsson 2007; Hanafizadeh et al. 2014; Hernandez and Mazzon 2007; Pikkarainen et al. 2004; Shih and Fang 2006; Szopiński 2016; Tarhini et al. 2016), much less research has investigated the continuous usage of IB service. However, on the one hand, the marketing research suggests that continuous use is more important than initial use because the cost for developing a new customer may cost as much as five times more than that for retaining an existing customer (Bhattacharjee 2001; Ko et al. 2008; O’Cass and Heirati 2015; Parthasarathy and Bhattacharjee 1998) and the long-term value can best be appropriated through loyal customers (Li et al. 2006). On the other hand, the significant differences between the initial adoption and continuous usage of IB service (Tsai et al. 2014) suggest that the theory about the adoption of IB service may not be applicable to the continuous usage of IB service. Moreover, the distinguishing IB service from the continuous usage of traditional products and/or services implies that the customer retention theory may not be applicable either (Li et al. 2006). Therefore, it is necessary to examine the continuous usage intention in the context of IB service. This study intends to fill the research gap by proposing and testing an integrative model of continuous usage intention of IB service with an attempt to examine the role of customers’ psychological cognition (i.e., trust and commitment) in improving users’ continuous usage intention of IB service.

Integrating the commitment-trust theory (CTT) (Morgan and Hunt 1994) and intention-based model of unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), we argue that only satisfied users have continuous intentions to use IB service, while the user satisfaction is determined by their trust and commitment to the IB service, which in turn, is influenced by their usage experiences in terms of perceived service value, quality of alternatives and their

anxiety on using IB service. These hypotheses were tested by structural equation modeling using survey data from 173 non-traditional college students who were all full-time employees with several years of working experience.

In the following sections, we review the IB literature and present the theoretical background of our research model, and then develop our hypotheses, followed by a discussion of methodology. This is followed by data analysis and results. Finally, discussions and conclusions are presented.

2 Theoretical background

2.1 Internet banking

Internet banking (IB), or online banking, an innovative way for banks to deliver the services, can benefit end users with more convenience (Hanafizadeh et al. 2014; Montazemi and Qahri-Saremi 2015) and create value for financial institutions (Witman and Roust 2008). However, the IB adoption rate by end users is relatively low although heavy investments have been made by many banks (Montazemi and Qahri-Saremi 2015; Szopiński 2016). Thus, scholars start to explore the determinants of IB adoption or acceptance from the customer perspectives recently. For example, based on Theory of Planned Behavior (TPB) (Ajzen 1985) and Technology Acceptance Model (TAM) (Davis 1989), ease of use and perceived usefulness are identified as important antecedents of IB adoption (Al-Somali et al. 2009; Alwan and Al-Zubi 2016; Boateng et al. 2016; Cheng et al. 2006; Lee 2009; Montazemi and Qahri-Saremi 2015; Nasri and Charfeddine 2012; Yiu et al. 2007). Extending these theories, some researchers find that perceived risks and website security affect IB adoption too (Cheng et al. 2006; Yiu et al. 2007). Drawing on Social Cognitive Theory (SCT) (Bandura 1986), website social feature, online service, and lifestyle compatibility are confirmed as determinants of IB adoption (Boateng et al. 2016). From the CTT (Morgan and Hunt 1994) perspective, some studies highlight the role of trust and commitment in promoting IB adoption (Alsajjan and Dennis 2010; Dimitriadis and Kyrezis 2010; Kassim 2006; Mukherjee and Nath 2003). An integrated model, UTAUT (Venkatesh et al. 2003), has also been applied to examine the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on IB adoption in different countries, such as Jordan (Abushanab and Pearson 2007), Kuala Lumpur (Foon and Fah 2011), and Lebanon (Tarhini et al. 2016).

In spite of substantial studies on the IB adoption, little attention has been devoted to the post-adoption or continuous usage of IB service, whereas the continuous behavior is more important than users' initial adoption (Tsai et al. 2014). It is because retaining an existing user requires fewer resources or efforts than developing a new one and can ultimately promote long-term viability and success (Bhattacharjee 2001; Eriksson and Nilsson 2007). Previous studies also suggest that users' intention to adopt or continue using an innovation may be affected by different decision factors (Fernandes et al. 2006; Li et al. 2011), since users' needs and wants are changing as their experience is gained (Blake et al. 2005; Eriksson and Nilsson 2007). In literature, only few studies have focused on the determinants of

continuance intention of IB service (Eriksson and Nilsson 2007; Tsai et al. 2014; Vatanasombut et al. 2008). For example, Tsai et al. (2014) explore the roles of system usability and satisfaction in users' intention to continue using IB service. In the work of Montazemi and Qahri-Saremi (2015), they identify ten factors (including trust and three UTAUT variables) that affect users' pre-adoption and post-adoption of online banking. Considering the importance of continuous usage of IB services, much more effort should be devoted to echoing the call for investigating the antecedents of continuous usage of IB service. Moreover, more research is needed to explore whether or how the critical factors in the adoption period have effects on the continuous behavior in the context of IB.

2.2 Commitment-trust theory (CTT)

The CTT (Morgan and Hunt 1994) outlines the role of trust and commitment in relationship marketing as key mediating variables between a group of antecedents and outcomes. It argues that trust between exchange parties can help reduce the vulnerability of the relationship, and thus enhances relationship commitment (Boateng and Narteh 2016; Chang et al. 2012; Geyskens et al. 1996; Morgan and Hunt 1994; Nusair et al. 2013), which in turn, strengthens cooperation, satisfaction and relationship continuance by reducing propensity to leave and enhancing customer retention (Ganesan 1994; Gounaris 2005; Gustafsson et al. 2005; Morgan and Hunt 1994). Trust is defined as the confidence in the reliability and integrity of the other party (Morgan and Hunt 1994), and commitment refers to a belief that a relationship is so important that it warrants maximum effort to maintain (Morgan and Hunt 1994).

Despite the fact that the CTT is developed in the context of relational exchanges, it also provides a powerful theoretical basis to explain the usage of online services (including IB service) (Gefen et al. 2003; Li et al. 2006). For example, Gefen et al. (2003) examine trust as a key mediator to explain intended use of online shopping, while Li et al. (2006) develop a commitment-based model of Web site use, which uses commitment as a mediator to explain the behavioral intention of continuously using a Web site. Susanto et al. (2013) conduct a comparative investigation between Indonesia and South Korea about the influence of trust, commitment, and satisfaction on Internet Banking success. Following this research stream, we employ the CTT as a theoretical basis to explain customers' continuous usage intention of IB service and argue that customers' usage experiences affect their satisfaction with and continuous intention of using an IB service through psychological reactions (i.e., trust and commitment). CTT is appropriate because the continuous usage of IB service can be viewed as users' relationship maintaining with IB service and CTT is a prevalent theory to explain the psychological cognition for relationship maintaining (Li et al. 2006). Moreover, in the online context, the psychological cognition (i.e., trust and commitment) plays an important role in predicting the use (Li et al. 2006) and continuous use of online services (Carlsson et al. 2006; Susanto et al. 2013). In our context of IB, we focus on customers' trust in and their commitment to the IB service. Trust refers to a customer's confidence in the reliability and integrity

of the IB service of a bank, while commitment refers to a customer's belief that the IB service of a bank is so important that it warrants continuous use.

2.3 Unified theory of acceptance and use of technology (UTAUT)

UTAUT (Venkatesh et al. 2003) is a unified model, which is formulated by integrating elements across eight technology acceptance models—the theory of reasoned action (TRA), the technology acceptance model (TAM), the motivational model (MM), the theory of planned behavior (TPB), model of PC utilization (MPCU), a model combining the technology acceptance model and the theory of planned behaviour (C-TAM-TPB), the innovation diffusion theory (IDT), and the social cognitive theory (SCT). UTAUT was originally built up to explain and predict users' initial adoption of new information technology (Abushanab and Pearson 2007; Tarhini et al. 2016; Zhou et al. 2010). It proposes that the adoption, or acceptance, of new information technology, is mainly determined by four factors: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) (Venkatesh et al. 2003). Specifically, PE is synonymous with perceived usefulness (TAM), referring to the degree to which an individual believes that using the system can contribute to valued outcomes. EE is similar to the concept of perceived ease of use (TAM), reporting the degree to which a user believes that understanding and using a system is free of effort. SI is rooted from subjective norm (TRA) reflecting the influence of important others. FC captures the technological and organizational advantages that promote individuals to use the system. In addition, an individual's affective reactions (i.e., attitude toward using technology, self-efficacy, and anxiety) are theorized to be indirect determinants of intention (Venkatesh et al. 2003).

The UTAUT has been widely used in predicting the acceptance and use of information systems across a wide variety of contexts, such as tablet adoption (Mag-samenconrad et al. 2015), mobile service (Carlsson et al. 2006), social media (Gruzd et al. 2012), mobile payment (e.g., Khalilzadeh et al. 2017; Slade et al. 2015), mobile banking (Oliveira et al. 2014; Yu 2012; Zhou et al. 2010), as well as the adoption of IB (e.g., Im et al. 2011; Martins et al. 2014; Tarhini et al. 2016). For example, Abushanab and Pearson (2007) employ the UTAUT to explain the adoption of IB service in Jordan and find that performance expectancy, effort expectancy, and social influence significantly predict a customer's intention of use IB service; additionally, they find these relationships are contingent on customer gender.

Recently, UTAUT has been extended to the post-adoption situations to explain the continuous usage of information technology (e.g., Chiu and Wang 2008; Venkatesh et al. 2011; Wu et al. 2014; Zhou 2011) by regarding continuous use as an extension of adoption. For instance, applying UTAUT, Wu et al. (2014) examine the direct influence of four UTAUT constructs as well as trust and satisfaction on continuous use of online social networking. Recent research of Montazemi and Qahri-Saremi (2015) examines the effects of structural assurances, social influence, and customers' innovativeness on customers' perceptions of IB (i.e., perceived usefulness, perceived ease of use, and trust), which in turn influence their intention to use

IB service. In addition, they find that the relative importance of these factors is different in pre-adoption and post-adoption stages.

Following this research stream, the present study also employs UTAUT to predict the continuous usage intention of IB service. However, different from traditional UTAUT focusing on four beliefs—PE, EE, SI, and FC, we argue that users' continuous usage intention of IB is mainly determined by their experiences in using IB services (i.e., perceived service value, quality of alternatives, and users' anxiety), because users' intention to continue using a technology is influenced by their post-adoption perceptions of technology performance (Kim 2012; Tsai et al. 2014). Perceived service value reflects a user's overall assessment of IB service, that is, their perceived tradeoff between benefits and risks in using the IB service based on their usage experiences. Quality of alternatives refers to the perceived desirability of the best available alternative as compared to the IB service currently being used by a user. Anxiety is defined as evoking anxious or emotional reactions in using IB service. While anxiety is suggested to have an indirect effect on users' behavior intention in UTAUT (Venkatesh et al. 2003), perceived service value can capture the meaning of a user's PE based on her/his usage experiences, and quality of alternatives can reflect EE as it can be viewed as a user's opportunity cost of using IB service while EE reflects the expected costs. In this research, only PE and EE are considered because their relationships with behavioral intention are the most important part of the UTAUT model (Im et al. 2011). Besides, facilitating conditions is significant in predicting actual usage rather than intention (Abushanab and Pearson 2007; Venkatesh et al. 2003). Thus FC is excluded from our model. Therefore, adapting UTAUT to the post-adoption situation, we propose that perceived service value, quality of alternatives, and anxiety are to jointly determine the users' continuous usage intention of IB service.

3 Conceptual model and hypotheses

Based on the IB literature and theories presented in the previous section, we develop an integrative research model of continuous usage intention of IB (see Fig. 1). Integrating the CTT and UTAUT in predicting continuous usage intention, we propose usage experiences (i.e., perceived service value, quality of alternatives, and anxiety)

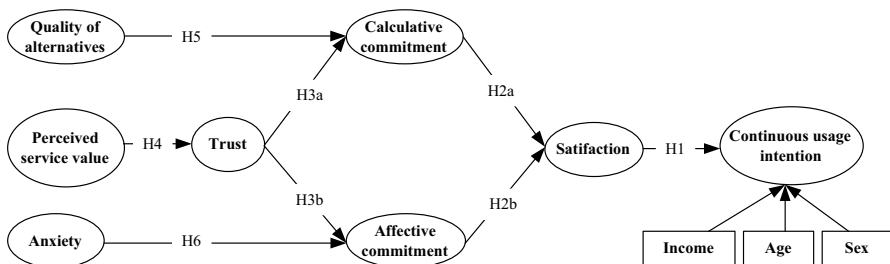


Fig. 1 Conceptual model

are antecedents and trust, commitment, and satisfaction are proposed as mediators. The hypotheses are developed as follows.

3.1 User satisfaction and continuous usage intention

The satisfaction research on continuous use suggests a satisfied customer is more likely to stay in business (Abdinnour-Helm et al. 2005; Bhattacharjee 2001; Zhao and Lu 2012). A number of studies have found the positive association between users' satisfaction and continuous usage intention (e.g., Lien et al. 2017; Pereira et al. 2015; Tsai et al. 2014; Zhou 2013). For instance, Deng et al. (2010) find that user satisfaction has a positive influence on continual usage intention of IT. In examining the IB in Taiwan, Tsai et al. (2014) find that user satisfaction positively affects continuous IB service usage intention. Thus, we hypothesize that:

H₁ Satisfaction has a direct positive effect on continuous usage intention.

3.2 Trust and commitment

Borrowing the CTT from the exchange relationship literature, a number of studies have examined the role of trust and commitment in the context of e-commerce (including IB) (Boateng et al. 2016; Chaouali et al. 2016; Dimitriadis and Kyrezis 2010; Lee et al. 2011; Li et al. 2006; Lin 2011). In the context of IB service, trust has been defined as the assured confidence a user has in the IB service provider's ability to provide reliable service through the Internet. It serves as a basis for users' decision to use a new technology (Gefen et al. 2008) and has been widely identified as a noteworthy antecedent of IB adoption (Boateng et al. 2016; Chaouali et al. 2016). Comparing to considerable research on trust in the IB, the role of users' commitment remains largely unaddressed in the IB context.

Different from trust that has been examined as a determinant of initial use, or adoption, or acceptance, the notion of commitment mainly focuses on continuous usage (Li et al. 2006). According to the commitment literature, commitment reflects a decision maker's motivations to continuously stay within the relationship (or organization, or action), such as affective bond with the relationship (or organization, or action), avoiding losing investment with the relationship (or organization, or action), and/or justifying the rightness of earlier decisions. With such a broader view of driving forces of continuous actions that commitment captures, previous studies have conceptualized commitment with different dimensions. For example, Allen and Meyer (1990) propose that commitment has three dimensions: affective, calculative, and normative, while Brown et al. (1995) operationalize commitment as normative commitment and instrumental commitment. As to the online context, Li et al. (2006) focus on affective commitment and calculative commitment because they believed that normative commitment is less relevant to the online context. Considering the research context of IB, this study follows Li et al. (2006) and focuses on affective commitment and calculative commitment. The former reflects a user's desire to continue the valued

relationship with IB because of the feelings of attachment and identification in use, while the latter represents a user's intention to continue using IB service because of its convenience and cost-effectiveness (Allen and Meyer 1990). For example, one commits to using IB service because she/he feels happy in doing so, which is affective commitment, while one continues to use IB service because she/he doesn't want to bear the switch costs (to other bank channels), referring to calculative commitment.

Affective commitment focuses on the emotional aspects of a relationship (Allen and Meyer 1990; Geyskens et al. 1996), and we define it as the affective or emotional attachment of a user to using IB service in the present study. Affective commitment to IB reflects the extent to which a user is willing to continue to use this service resulting from the user's positive attitudes toward her/his use of IB service in the past, which is generally associated with affection, happiness, and pleasure. Such emotional experiences may affect the user's satisfaction with the IB service used. Calculative commitment focuses on economic factors in a relationship (Allen and Meyer 1990; Geyskens et al. 1996), and we define it as the degree to which a user would lose if she/he stops using IB service, and/or to which she/he would get if continuing to use the IB service. With this definition, calculative commitment refers to the perceived economic rewards of the IB service comparing to traditional bank service and reflects the user's previous investment in using the IB service, such as time and efforts invested in learning the IB technology, in training skills, and in purchasing hardware and software, among others. High level of such perceived economic rewards would generate user satisfaction, while such previous investments constitute sunk costs, and serve as a powerful inducement to continue using the IB service.

Despite the differences, previous studies have found both affective commitment and calculative commitment positively affect a user's behavior intentions (e.g., Gustafsson et al. 2005; Li et al. 2006). As to the IB context, we argued that a user's continuous usage intention may be not directly determined by her/his emotional attachment or perceived economic rewards or losing. Instead, it is directly determined by a user's overall satisfaction with the IB service, which can be produced by both types of commitment. In fact, affective commitment to the IB service leads to user satisfaction through inducing positive feelings, while calculative commitment generates user satisfaction by increasing the perceived economic rewards of using IB service. Thus, we hypothesize:

H_{2a} Calculative commitment has a positive effect on satisfaction.

H_{2b} Affective commitment has a positive effect on satisfaction.

In the context of IB, trust has been widely identified as an important determinant of IB adoption (Boateng et al. 2016; Chaouali et al. 2016). However, different from initial use, the continuous usage of IB service may not be directly determined by trust. Rather, the role of trust is carried on by commitment and user satisfaction. On the one hand, the decision of continuous usage is made

based on the experiences of using IB service and considering the rewards and costs, which outlines the importance of commitment and satisfaction. On the other hand, according to the CTT, trust is also a key antecedent of commitment (Morgan and Hunt 1994). In fact, a user's trust in IB services can decrease her/his worry about the ease of use and security of IB service. In addition, trust enables users to believe that IB service is reliable thus making them have a sense of affiliation and identification with IB (Gounaris 2005). Such positive emotions can increase users' willingness to keep on using IB service, namely, affective commitment to IB service (Gustafsson et al. 2005; Hansen et al. 2003). Moreover, with the trust to IB services, the user may have made more investments and may have more confidence to achieve the economic rewards of IB services, both of which increase calculative commitment. In sum, we propose:

H_{3a} Trust has a positive effect on calculative commitment.

H_{3b} Trust has a positive effect on affective commitment.

3.3 Experiences in using IB service

Users' intention to continue using IB service is mainly determined by their experiences in using IB service. As stated before, adapting UTAUT to the continuous usage situation, perceived service value, quality of alternatives, and anxiety are important experiences that affect users' continuous usage intention of IB service. The notion of perceived service value and quality of alternatives capture the performance of IB service and the required effort in users' eyes based on their usage experiences, while anxiety reflects both users' effort expectancy and their concerns on security of IB. In the literature, performance expectancy/perceived usefulness, effort expectancy/perceived ease of use, and perceived security have been widely verified as important antecedents of continuous usage intention (Chaouali et al. 2016; Chiu and Wang 2008; Tsai et al. 2014; Wu et al. 2014). Different from previous studies, we argue that the usage experiences (i.e., perceived service value, quality of alternatives, and anxiety) do not affect continuous usage intention of IB service directly, rather they play their roles through affecting trust and commitment.

Perceived service value refers to a user's overall assessment of the IB service based on the perception of what is given and taken (Zeithaml 1988). It captures the connotation of performance expectancy, which is verified to have a significantly positive effect on behavioral intention (Im et al. 2011; Khalilzadeh et al. 2017; Zhang et al. 2018). In marketing literature, perceived service value is suggested to be a leading predictor of behavioral intention (Chiu and Wang 2008; Hsu and Lin 2015; Hutchinson et al. 2009; Ladhari et al. 2017). In the context of IB, we propose that perceived service value predicts a user's continuous use of IB service through influencing the user's trust in IB service. In fact, this argument is supported by several previous empirical studies. For example, Woodruff (1997) points out that consumers' perceived value could enhance

consumers' trust in the supplier. Sirdeshmukh et al. (2002) find a direct relationship between perceived value and trust. Therefore, we hypothesize:

H₄ Perceived service value has a direct positive effect on trust.

The quality or attractiveness of alternatives represents the perceived desirability of the best available alternative as compared to the IB service and can act as an indicator of users' perceived opportunity cost of using the current IB service. It is viewed to determine user's dependence on a relationship, and has been widely accepted as a powerful predictor of calculative commitment (e.g., Bansal et al. 2004; Li et al. 2006; Nusair et al. 2011; Shukla et al. 2016; Yanamandram and White 2010). In the IB context, the alternatives to IB refers to the traditional banks that can provide similar banking services. If the alternatives are competitive or the IB service cannot meet user's effort expectation, customers are likely to be attracted by the relative advantages of the alternatives and thereby making IB unvalued (Li et al. 2006). However, if alternatives are not available or uncompetitive, customers will be locked in current relationship resulting in calculative commitment (Gustafsson et al. 2005; Li et al. 2006). Calculative commitment is based on cost-oriented calculations. Hence it is closely tied to the quality and availability of alternatives (Bilgihan and Bujisic 2015). Previous empirical studies have shown a negative relationship between quality of alternatives and calculative commitment (or continuous commitment) (Bansal et al. 2004; Huang et al. 2007; Li et al. 2006; Nusair et al. 2011; Yanamandram and White 2010). For example, Li et al. (2006) find that quality of alternatives has a significant negative effect on calculative commitment of Web site use. Thus, we propose:

H₅ Quality of alternative has a direct negative effect on calculative commitment.

Anxiety is apprehension or discomfort experienced by an individual with IB service. It is characterized by insecurity or an emotional fear of potential negative outcomes, such as exposure of private information, irrevocable wrong operations, among others. Previous studies have shown that perceived security is very important for users intention to use IB service (e.g., Cheng et al. 2006; Yoon and Steege 2013). In addition, anxiety is supposed to significantly influence IB users' behavior intention by generating negative perceptions (El-Qirem 2013; Faqih and Jaradat 2015; Venkatesh and Bala 2008). In line with these studies, we argue that anxiety negatively affect users' affective commitment. The emotional fear and insecurity would generate negative feelings, which decreases the users' affective or emotional attachment to using IB service. Therefore, we hypothesize:

H₆ Anxiety has a direct negative effect on affective commitment.

3.4 Controls

We include gender, age, and income as control variables. The literature suggests that gender and age are important variables when examining social factors. For

example, women tend to be more sensitive to others' opinions and thus social influences are more salient (Venkatesh and Morris 2000). Similarly, older individuals are more likely for salient social influences (Morris and Venkatesh 2000). In addition, wealthy individuals appear more likely to use IB and subscribe to more banking services (Sathye 1999), thus they may be more inclined to use Internet banking (Tan and Teo 2000).

4 Methodology

4.1 Sampling

Non-traditional college students, who were all full-time employees with several years of working experience, were used in this study. This sampling was consistent with the previous studies with similar research context (e.g., Akinci et al. 2004; Sathye 1999). In addition, to further confirm our participant selection, we consulted several experienced bankers who were in charge of the IB services (Chau and Lai 2003). These bankers indicated that their target customers of IB services would be college-educated, computer-literate, 20-to-50-year-old, and employed individuals.

A total of 218 non-traditional college students were surveyed. Before the survey, the students were informed that the participation was voluntary, and their responses would be kept confidentially and be analyzed only at the aggregate level. We received 205 responses. Among those responses, 32 were partially completed, and consequently, they were excluded from the data analysis. Thus, we had a sample size of 173 responses, representing 84.4% response rate. The

Table 1 Respondent profile

Demographic profile	Percent (%) (N=173)
Gender	
Male	43
Female	57
Age	
Under 24 years	37
24–34 years	31.8
35–49 years	24.9
50 years or over	5.8
Missing	0.5
Income	
Less than \$20,000	14.1
\$20,000–\$29,999	15.6
\$30,000–\$49,999	38.3
\$50,000–\$69,999	21.6
\$70,000 or more	5.8
Missing	4.6

respondent profile is presented in Table 1, which shows the sample largely represent the IB user population in terms of age and income.

4.2 Scales

To enhance the content validity of the measures, we took several steps. First, we went through an intensive review of the literature to valid measurements for the related constructs. Wherever possible, existing measures that had been used in previous studies were adopted. Second, the initial questionnaire was pilot tested with bank customers who had IB experience. The questionnaire was further revised based on the inputs provided by the pilot test. The design for the measurement items is described below, and all the items were anchored on a 7-point Likert scale, with “1” representing “completely disagree” and “7” representing “completely agree”.

Following Cheng et al. (2006), continuous usage intention was used as dependent variable rather than actual usage, because, theoretically, the usage intention and actual usage are high correlated (Venkatesh and Morris 2000); operationally, usage intention is more appropriate than actual usage for a survey-based research design (Cheng et al. 2006). The scale of users’ continuous usage intention was adapted from Cheng et al. (2006). Three items were used to measure users’ intention to use IB service continuously.

The measure of trust and commitment was adapted from Li et al. (2006). Three items of trust were employed to measure the extent to which a user has confidence in the reliability and integrity of the IB service of a bank. Affective commitment was measured with three items that assess the extent to which the customer may take pleasure in using IB. Calculative commitment was measured with three items that assess the degree to which a user would lose if she/he stops using IB service, and/or to which she/he would get if continuing to use the IB service.

User satisfaction was conceptualized as a cumulative, global evaluation based on usage experiences over time (Homburg et al. 2005). The measures were adapted from Hutchinson et al. (2009).

The perceived service value scale was adapted from Hutchinson et al. (2009). Four items were used to measure the degree to which a user received superior net value from using IB services considering the service quality received and the time and energy spent. Adapted from Li et al. (2006), quality of alternative was measured by a three-item scale. The pilot test suggested that reverse questions could be more appropriate. Hence, reverse questions were employed. A five-item scale adapted from Venkatesh et al. (2003) was used to measure customers’ emotional reactions when they use the IB service (i.e., anxiety). Informants were asked to indicate their agreement on the concerns or emotional fears of using IB service, such as exposure of private information, irrevocable wrong operations, insecurity, among others.

The measures for the control variables of age, income, and gender were adapted from Cheng et al. (2006) and Tan and Teo (2000). The respondents were asked to choose the predefined grouping of their age, income, and gender.

5 Data analysis

Partial Least Squares (PLS) was used to analyze the data. PLS, a component-based approach, is suitable for predictive applications and theory building. In addition, PLS also does not strongly require the normal distribution on the source data (Chin 1998; Gefen and Straub 2005) and has the ability to handle a relatively small sample size with more complex model structure (Chin 1998). Considering the complexity and predictivity of our model and small sample, PLS-graph 3.0 was employed.

5.1 Measurement model

Convergent validity, discriminant validity, and reliability of all the multiple-item scales were analyzed by following the guidelines from previous literature (e.g., Fornell and Larcker 1981; Gefen and Straub 2005). The measurement properties are reported in Tables 2 and 3.

Reliability was assessed in terms of composite reliability. As shown in Table 2, all composite reliabilities (ranged from 0.786 to 0.984) in our measurement model are above the recommended cutoff of 0.70 (Fornell and Larcker 1981; Nunnally and Bernstein 1994), indicating acceptable reliability. Convergent validity requires factor loadings greater than 0.70 at the item level and average variance extracted (AVE) no less than 0.50 at the construct level (Fornell and Larcker 1981). As shown in Table 2, all factor loadings are significant ($p < 0.01$) and higher than 0.70 (except the item CC1). In addition, the AVEs ranged from 0.576 to 0.953, suggesting adequate convergent validity. Discriminant validity was assessed by comparing the square root of the AVE of each individual construct with correlations between this individual construct and all the other constructs. Higher square root of AVE of the individual construct than correlations suggests discriminant validity (Fornell and Larcker 1981). As shown in Table 3, all square roots of AVEs on the diagonal are higher than the inter-construct correlations off the diagonal of the matrix, demonstrating adequate discriminant validity.

5.2 Structural model

To test the proposed hypotheses, the structural model was fitted using the full sample. Using a bootstrapping technique, we calculated path loadings and t-statistics for hypothesized relationships. The structural model was assessed by estimating the path loadings and the R^2 values. The results are shown in Fig. 2.

As indicated by path loadings and their significance levels, user satisfaction has a positive and significant impact on continuous usage intention ($\beta = 0.667$; $p < 0.01$), supporting H_1 ; and both types of commitment significantly influence user satisfaction ($\beta = 0.315$ and 0.454 respectively; $p < 0.01$), suggesting support for H_{2a} and H_{2b} . The estimations also show that trust has positive and significant impacts on both

Table 2 Measurement model

Items	Loadings	T-values	CR	AVE
Trust				
TR1	0.902	51.73	0.888	0.728
TR2	0.899	49.20		
TR3	0.749	5.33		
Calculative commitment				
CC1	0.379	2.35	0.786	0.576
CC2	0.860	19.88		
CC3	0.919	42.20		
Affective commitment				
AC1	0.873	23.98	0.918	0.790
AC2	0.896	36.42		
AC3	0.897	43.56		
Perceived service value				
SV1	0.936	71.49	0.948	0.819
SV2	0.918	47.55		
SV3	0.852	30.52		
SV4	0.912	57.96		
Satisfaction				
SA1	0.931	42.85	0.976	0.910
SA2	0.974	135.77		
SA3	0.969	140.92		
SA4	0.942	62.73		
Anxiety				
AN1	0.826	21.13	0.934	0.740
AN2	0.847	28.62		
AN3	0.894	46.36		
AN4	0.870	33.41		
AN5	0.862	34.71		
Quality of alternative				
QA1	0.890	41.30	0.926	0.807
QA2	0.906	34.96		
QA3	0.899	38.21		
Continuous usage intention				
CI1	0.980	179.41	0.984	0.953
CI2	0.968	79.12		
CI3	0.981	157.64		

CR composite reliability, AVE average variance extracted

calculative commitment ($\beta=0.265$; $p<0.01$) and affective commitment ($\beta=0.421$; $p<0.01$), indicating that H_{3a} and H_{3b} were supported.

Regarding the users' experiences, perceived service value positively affects users' trust in IB service ($\beta=0.782$; $p<0.01$), while quality of alternatives negatively

Table 3 Correlations

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Trust (X1)	0.853										
Calculative commitment (X2)	0.454	0.760									
Affective commitment (X3)	0.538	0.289	0.889								
Perceived service value (X4)	0.782	0.459	0.614	0.905							
Satisfaction (X5)	0.749	0.446	0.545	0.858	0.954						
Anxiety (X6)	-0.445	-0.247	-0.450	-0.474	-0.483	0.860					
Quality of alternative (X7)	0.653	0.462	0.508	0.687	0.692	-0.421	0.898				
Continuous usage intention (X8)	0.597	0.445	0.465	0.597	0.665	-0.510	0.603	0.976			
Income (X9)	0.069	0.171	0.117	0.083	0.027	-0.161	0.121	0.111	NA		
Age (X10)	0.074	-0.010	0.111	0.073	0.042	-0.125	0.013	0.092	0.436	NA	
Sex (X11)	0.057	-0.111	-0.016	0.015	-0.047	-0.110	-0.009	0.066	-0.141	0.102	NA

The inter-construct correlation is shown below the diagonal; Squared root of variance extracted is shown on the diagonal of each matrix with bold
 NA not applicable to single-item construct

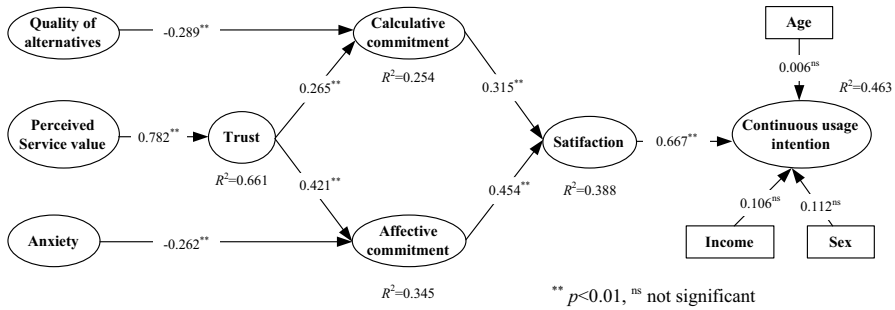


Fig. 2 Model estimates

influences calculative commitment ($\beta = -0.289$; $p < 0.01$) and anxiety has a negative and significant effect on affective commitment ($\beta = -0.262$; $p < 0.01$), demonstrating supports for H_4 , H_5 , and H_6 .

As to controls, the paths from income, age, and gender to continuous usage intention of using IB are all insignificant ($\beta = 0.106, 0.006, 0.112$, respectively).

In addition, our model shows good prediction power. The model explains 46.3% of the variance of continuous usage intention. Commitment explains 38.8% of the variance of user satisfaction. The model also explains 66.1% of the variance of trust, 25.4% of calculative commitment, and 34.5% of affective commitment.

5.3 Post-hoc analysis

As previous studies suggested that perceived service value, quality of alternatives, anxiety, trust, commitment all are predictors of continuous usage intention, we conducted mediating effect analyses. We tested the significance of the mediation effects and indirect effects using Sobel test (Sobel 1982). If the Sobel test leads to the critical z-value of 1.96, the mediator carries the influence of the independent variable to the dependent variable. An online version of this test is available at <http://quantpsy.org/sobel/sobel.htm> (Preacher and Leonardelli 2001).

The results suggest that the indirect effects of calculative and affective commitment on continuous usage intention are significant ($\beta = 0.315 \times 0.667 = 0.210$ and $0.454 \times 0.667 = 0.303$ respectively; $p < 0.01$), suggesting the mediating role of user satisfaction. The indirect path from trust to user satisfaction through calculative commitment is $0.083 (= 0.265 \times 0.315)$ ($p < 0.05$) while through affective commitment is $0.191 (= 0.421 \times 0.454)$ ($p < 0.01$), and the total indirect effect of trust on user satisfaction is $0.274 (= 0.083 + 0.191)$ ($p < 0.01$), suggesting that both calculative and affective commitment mediate the effect of trust on user satisfaction. Moreover, the total indirect effect of trust on continuous usage intention is $0.183 (= 0.265 \times 0.315 \times 0.667 + 0.421 \times 0.454 \times 0.667)$ ($p < 0.01$), suggesting that trust is also an important predictor of continuous usage intention. The total indirect effect of perceived service value on continuous usage intention is $0.143 (= 0.782 \times 0.183)$ ($p < 0.01$), the indirect effect of quality of alternatives is $-0.061 (= -0.289 \times 0.210)$ ($p < 0.01$), and the indirect effect of anxiety is $-0.079 (= -0.262 \times 0.303)$ ($p < 0.01$),

suggesting that perceived service value, quality of alternatives, and anxiety are also determinants of continuous usage intention of IB services, and their influences are carried on through trust, commitment, and satisfaction.

6 Discussions and conclusions

6.1 Major findings

By integrating the theories of UTAUT and CTT, the study examines how usage experiences influence continuous usage intention of IB service, with a focus on how psychological cognition (e.g., trust and commitment) helps usage experiences influence continuous usage intention. The analysis results reveal several valuable findings, as elaborated as follows. First, the usage experiences (e.g., perceived service value, quality of alternatives, and anxiety) have significant influences on continuous usage intention. Furthermore, our results also show that perceived service value is the more important experience of influencing continuous usage intention than quality of alternatives and anxiety, while the influences of quality of alternatives and anxiety are approximately equal.

Second, in the post-adoption situation, psychological cognition, such as trust and commitment, plays an important role in helping usage experiences influence continuous usage intention. Our results show that the influence of perceived service value (a.k.a. perceived value) on continuous usage intention is mediated by trust-commitment-satisfaction, including both calculative and affective commitment. In contrast, although the influences of quality of alternatives and anxiety on continuous usage intention are mediated by the trust-commitment-satisfaction chain, the effects of mediation are through calculative and affective commitment only, respectively.

Third, psychological cognition not only carries the influences of usage experiences but also improves continuous usage intention by itself. There are two ways for trust to influence continuous usage intention—*affective commitment* and *calculative commitment*. While both calculative and affective commitment mediate the effect of trust on user continuous usage intention, affective commitment is more efficient than calculative commitment regarding these mediation effects.

6.2 Research implications

Our study contributes to the literature in several aspects. First, this study contributes to the UTAUT literature by extending UTAUT from the initial adoption context to the post-adoption context of continuous usage intention and from the workplace technology context to the consumer technology context. Considering that the continuous usage intention is determined by users' usage experiences, based on UTAUT, we successfully identified three important types of usage experience (i.e., *perceive service value*, *quality of alternatives*, and *anxiety*). Our results confirm the applicability of UTAUT in the context of continuous usage of consumer technology. Although various theories, such as TAM and TRA, had been developed to examine

technology adoption, these theories, in general, could be applied to workplace contexts. In contrast, UTAUT is more comprehensive and integrative with wider applicability in different contexts, such as consumer technology.

Second, this study further elaborates the UTAUT model for continuous usage intention by incorporating CTT into UTAUT. The model delineates the mechanism regarding how usage experiences influence continuous usage intention and highlights the important mediating role of psychological cognition, such as trust and commitment in this mechanism. This model provides a useful framework for future studies on continuous usage of technologies.

Third, this study also contributes to the IB literature. Despite extensive studies that have focused on IB adoption, few studies have engaged in investigating the continuance intention of using IB service. Our study integrates usage experiences and psychological cognition to predict continuous usage intention of IB service, providing an example for future studies to explain the users' continuous usage intention of IB service.

Fourth, it is interesting to note that in our study trust can increase both affective and calculative commitment, which is inconsistent with previous studies. For example, Li et al. (2006) found trust significantly improves affective commitment but does not significantly influence calculative commitment. The positive relationship between trust and calculative commitment may be explained from the IB context. IB services can provide benefits such as convenience and round-the-clock availability of the service, comparing to traditional bank services. Users who trust the IB services are more likely to enjoy such benefits, and thus may be dependent on the IB services. As a result, they may feel a greater loss if stopping using IB service. In this sense, trust may promote calculative commitment.

6.3 Managerial implications

The findings also have several managerial implications for bank managers. First, as satisfied customers are more likely to continue using IB service that can promote long-term value for banks, our findings suggest that bank managers can apply two strategies to increase IB service users' satisfaction—improving users' calculative commitment and affective commitment. In addition to existing IB services, value-added services should be provided through IB, such as loans negotiations, insurance products, SMS/E-mail reminders, online customer service and personalization of services. These services could increase the opportunity costs of stopping the use of IB service (e.g., previous investments in learning the use of IB and the benefits of staying with IB), thus leading to customers' calculative commitment. Moreover, bank managers can also apply personalized design to deliver professional and customized services in IB channel so that they can feel a sense of belonging to IB service. Such positive affection can enhance users' affective commitment. For example, free online consultation for family financing can be provided to online customers to promote the attachment of existing IB customers to the banks.

Second, our findings suggest that bank managers can increase users' calculative and affective commitment through establishing users' trust on IB service. Increasing

users' perceived service value is very important to build users' trust. In addition, enhancing IB's value or competitive power is essential to develop users' calculative commitment to IB service. Therefore, bank managers should invest in improving IB service value, such as providing friendly and conveniently-operated services and flexible combinations of a variety of IB services with low service fees. Moreover, to improve users' affective commitment, bank managers can invest in the technology for IB security and strongly promise to protect customers' privacy.

Third, our findings indicate that affective commitment plays a more important role in improving continuous usage, comparing to calculative commitment. Thus, bank managers may distinguish the two types of customer commitment and make more efforts on developing affective commitment. That is, bank managers should pay more attention to users' emotions when using IB service. More importantly, our findings suggest that bank managers should make efforts to decrease users' anxiety because it hampers the developing of affective commitment. In doing so, they may need to exhibit the bank's capability of security and secrecy of IB service, and they may increase the ease of use of IB service. On the other hand, despite calculative commitment may be not as efficient as affective commitment, it is still influential. Bank managers can make efforts to develop it by improving the attractiveness (such as convenience, better services with lower costs) of IB services comparing to traditional bank services.

6.4 Limitations and future research directions

Although the present study contributes to the literature and provides valuable insights, it has several limitations. First, the present study focuses on continuous usage intention, rather than actual continuous usage. Despite the high correlation between usage intention and actual usage (Venkatesh and Morris 2000), intention does not necessarily lead to actual usage. Future studies may go beyond continuous usage intention to actual continuous usage behaviors.

Second, the present study only considers the influences of users' subjective perceptions of usage experiences, trust/commitment, and satisfaction on continuous IB service usage intention. Such cross-designed subjective measures may suffer from method bias, such as item ambiguity (Podsakoff et al. 2003). Future research may explore the effects of objective features (such as usage frequency and the length of using, among others) on users' continuous usage intention of IB service.

Third, the results may be affected by sampling bias, because our sample involved only a specific user group in the USA and this data is skewed by age and is concentrated in younger age groups with 37% respondents under 24 years old. Such bias may limit the generalizability of the findings to broader populations. As the usage behaviors of IB service may be different across cultures and age groups, future studies may investigate the role of trust and commitment on continuous usage of IB service within different cultures and compare the findings, and/or examine it with diverse sample groups (across age) in order to verify the robustness of our findings.

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Appendix: Measures and scales

Perceived service value (SV) Regarding your experience with IB, please indicate to which degree you agree with the following statement:

- SV1. Compared to the time and energy for the IB, I got reasonable service quality.
- SV2. Compared to the service quality I got from the IB, the time and energy I spent is reasonable.
- SV3. My experience with the IB gives me superior net value.
- SV4. Overall, I received superior value for the time and energy I spent on the IB.

Trust (TR) Regarding your experience with the IB, you feel that the IB:

- TR1. Can be counted on.
- TR2. Has your confidence.
- TR3. The bank has high integrity.

Affective commitment (AC) The following statements are regarding the results of using IB. Please indicate the degree to which you agree:

- AC1. I would have no difficulty telling others about the results of using IB.
- AC2. I believe I could communicate to others the consequences of using IB.
- AC3. The results of using IB are apparent to me.

Calculative commitment (CC) Please indicate degree to which you agree the following statements:

- CC1. I am afraid something will be lost if I do not use IB.
- CC2. If I stop using IB, I may sacrifice a lot of good things, such as saving money and getting good deals.
- CC3. Some aspects of my life would be affected if I stop using IB.

Anxiety (AN) The following statements describe your concerns of using IB. Please indicate the degree to which you agree:

- AN1. I feel apprehensive about using IB.
- AN2. It scares me to think that I may have to give out a lot of private information using IB.
- AN3. I hesitate to use IB for fear of making mistakes I cannot correct.
- AN4. I hesitate to use IB for fear of security issues.
- AN5. The IB is somewhat intimidating to me.

Quality of alternatives (QA) Comparing with the traditional local banks, you feel that:

- QA1. The Internet bank is more appealing.
 QA2. The Internet bank has better services and lower costs.
 QA3. The Internet bank is closer to being ideal.

Satisfaction (SA) Regarding your experience with IB, please indicate to which degree you agree with the following statement:

- SA1. I am satisfied with the IB.
 SA2. I am pleased with the IB.
 SA3. I am contented with IB.
 SA4. I am delighted with IB.

Continuous usage intention (CI) Please indicate the degree to which you agree the following statements regarding your intention of continuously using IB in the future:

- CI1. I would continue to use the IB for my banking needs.
 CI2. Continuing to use the IB for handling my banking transactions is something I would do in the future.
 CI3. I would continue to see myself using the IB for handling my banking transactions.

- Income* How much is your annual income?
Age How old are you?
Sex Are you female?

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