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Understanding broadband television users' continuance intention to use

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Abstract

Purpose – Based on the tricomponent attitude model, a research model is developed to investigate the factors that influence users' use intentions regarding broadband television. These factors are divided into vendor's service and personal psychology perspectives. The paper aims to discuss these issues.
Design/methodology/approach – The research sample consisted of 631 respondents with experience in using broadband television. This study adopted structural equation modeling to test the proposed model.
Findings – The results show that the structural model has a good fit and indicates that perceived system quality, perceived content quality, customization, perceived ease of use, and perceived risk directly influence users' opinions toward broadband television and indirectly affect their continuance intention to use through attitude to use.
Practical implications – From a managerial standpoint, this study can assist internet protocol television (IPTV) service providers in understanding the critical determinants that influence consumers' continuance intention to use IPTV.
Originality/value – This study contributes to the understanding of consumers' continuance intention to use IPTV by introducing customers' perspectives for vendor's service factors (perceived system quality, perceived content quality, customization, and perceived ease of use) to current theoretical models. From a personal psychology perspective, this study provides sound evidence that the determinants of perceived price level and perceived risk are critical factors that affect consumers' attitude to use and continuance intention to use of broadband televisions.

Keywords Customization, Continuance intention to use, Internet protocol television (IPTV), Perceived content quality, Perceived system quality, Tricomponent attitude model
Paper type Research paper

Introduction

Broadband television is service system that uses broadband networks as transmission links to send video messages. Internet protocol television (IPTV) is the most common type of broadband television. According to the forecasts results of Pyramid Research (2013), the number of IPTV subscribers worldwide in 2013 was over 100 million users, the largest increase in the Asia Pacific region. According to the estimation of MRG analysis, the global number of users of IPTV service will jump to 101 million in 2014 and the overall global IPTV service revenue will reach $46 billion in 2014 (North America Intellectual Property Co., 2014). The interactive multimedia services (multimedia on demand (MOD)) are the future mainstream services of IPTV.

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MOD integrates different media with personalized and interactive features. Digital media industry will be the potential star industry in the near future. MOD service is likely to become an important industry of telecom companies in the development of competitive advantage.

The growth rate for IPTV use between 2010 and 2013 reached 24.6 percent in Taiwan. Taiwan's IPTV subscribers will reach 1.6 million in 2014. Over the next five years, Taiwan's mobile TV market expects an average 30 percent of annual growth rate (PwC Taiwan, 2014). According to IDC survey, total value of the global IPTV with major hardware and software was up to 3 billion US dollars in 2013 (Business Next, 2014). In many countries, IPTV is with strong government support and encouragement. With telecom companies and network companies heavily invest in this area which become the most rapidly growing field. This means that IPTV market opportunities are still great development potential in the future.

Following the development of smart phones, tablet PCs, and 3D technologies, broadband television is likely to replace traditional televisions, transforming consumers from passive users of traditional television (i.e. consumers must watch their desired programming at a specific time) to managers of a digital audio and visual on demand entertainment service (i.e. consumers can watch their desired program anytime). The novel trend of future broadband services will tend toward triple play services (Shin, 2009b) including voice over internet protocol (VOIP), web access, and IPTV. How to gain new customers and understand the use and decision-making behaviors of current broadband television users have become the primary foci of related industries in an effort to improve management and planning practices.

Based on the aforementioned research background, the following question warrants further investigation: why do consumers demonstrate lower levels of acceptability for the interesting, enjoyable, and user-friendly MOD than for Community Access Television (CATV) using traditional technologies? Shin (2009b) found that, despite the innovative functions and convenience of IPTV, the key to the Taiwanese market is how industries can change consumers' habits and perceptions to enable them to experience the novel technologies and services provided by IPTV, subsequently increasing their willingness to use this service. Therefore, industries should focus their attention on methods for understanding the experiences of consumers when using novel technologies. They should consider that consumers typically expect that IPTV provide continuous innovation of service content and reduced rates and prices. Consequently, this can entice consumers to accept and use novel IPTV technologies, increasing their continuance intention to use (Shin, 2009b).

Some recent studies explored the impact of e-service quality on customer behavior in e-banking services (Chen, 2013; Marimon *et al.*, 2012; Ribbink *et al.*, 2004), mobile value-added services (Wang and Li, 2012), multi-channel (Hsieh *et al.*, 2012; Sousa and Voss, 2012), or supplier-dealer marketing channels (Chang *et al.*, 2012). Some studies even applied the service quality concept to information systems (IS) and information technology (IT) (Hsu *et al.*, 2013; Sohn and Tadisina, 2008). From the above perspective, we address the following research gaps. Regarding theory construction, the majority of scholars integrated various theoretical constructions and frameworks, such as the technology acceptance model (TAM) and information system success (ISS) (Karjaluoto *et al.*, 2014; Kim *et al.*, 2008; Shin, 2007b, 2009a, b; Shin, 2012). In the past decade, many studies adopted the related researches of acceptance or rejection of user's model for IS (Al-Debei and Al-Lozi, 2014). Especially in the domain of technology adoption research, the challenge is to understand and explore the decision-making behavior of consumers.

It is mainly to understand why consumers adopt or do not adopt some services or technology (Carlsson *et al.*, 2006), in order to reduce the risk of resistance to use of the services (Dillon, 2001).

On the other hand, the scholars of IS explore the adoption and usage of technology from the socio-economic characteristics (Dwivedi and Lal, 2007; Gefen and Straub, 1997; Venkatesh and Morris, 2000; Venkatesh *et al.*, 2003). Moreover, the mainstream research is on the adoption of broadband in the technology adoption area at present (BSG Briefing Paper, 2004; Dwivedi *et al.*, 2009; Hill *et al.*, 2011, 2014; Irani *et al.*, 2009). This study adopted broader IS/technology adoption theory to explain the theoretical development of the model and fill up the research gap of previous studies. This study employs the tricomponent attitude model proposed by Rosenberg and Hovland (1960), which explicates the formation of consumers' attitudes based on the three phases of personal cognition, affection, and conation. In contrast to the TAM, ISS, and technology adoption theory, the theoretical basis and variables in this study explain more of the cognitive perspectives expressed by consumers regarding various aspects, rather than simply adopting perspectives based on IS. For the theoretical construct, the studies of the technology adoption issue in the past, Roger's innovation diffusion theory is normally used to understand the digital divide (Mason and Hacker, 2003) or the beliefs, attitudes, and intentions of broadband mobile services of users (Yoo *et al.*, 2005). TAM is a combination of four core factors of IT usage (Venkatesh *et al.*, 2003). In the consideration of research variables, TAM has added trust, perceived enjoyment, privacy, security, compatibility, and self-efficacy (e.g. Mao and Palvia, 2006; Shih, 2004a; Vijayasarathy, 2003; Yoo *et al.*, 2005). Although the explanatory power of these new research models have improved the deficiency of the explanatory power of original model, these models become more parsimony and replicability (Lai and Li, 2005; Liao *et al.*, 2009). However, these studies were accustomed to investigate from the viewpoint of IT adoption. They did not distinguish from the viewpoint of users' cognitive. TAM is a combination of four core factors of IT usage (Venkatesh *et al.*, 2003). In the consideration of research variables, TAM has added trust, perceived enjoyment, privacy, security, compatibility, and self-efficacy (e.g. Mao and Palvia, 2006; Shih, 2004a; Vijayasarathy, 2003; Yoo *et al.*, 2005). Although the explanatory power of these new research models have improved the deficiency of the explanatory power of original model, these models become more parsimony and replicability (Lai and Li, 2005; Liao *et al.*, 2009). However, these studies were accustomed to investigate from the viewpoint of IT adoption. They did not distinguish from the viewpoint of users' cognitive. Therefore, this study divided consumers' cognitive factors into customers' perspectives for vendor's service and personal psychology perspectives to study the attitude to use and continuance intention to use of broadband television users regarding MOD digital television. Consequently, this study adjusted previous research methods (Bai *et al.*, 2008; Li and Yeh, 2009; Liao *et al.*, 2007; Ribbink *et al.*, 2004; Zhou, 2014) in which a single customers' perspectives for vendor's service is used to examine users' consumption decisions. In this study, based on consumers' cognitive perspectives and the tricomponent attitude model, we investigated predisposing factors related to the continuance intention to use of broadband television users.

According to these research motives and perspectives, the objectives of this study are as follows: first, to investigate and understand, from customers' perspectives for vendor's service, the four factors that affect broadband television users, including perceived system quality, perceived content quality, customization, and perceived ease of use. Second, to understand which factors are determinants that affect the attitude to

use and continuance intention to use of broadband televisions users? Third, to examine, from a personal psychology perspective, the two factors that influence broadband television users, including perceived price level and perceived risk. Fourth, to determine which factors are determinants that affect the attitude to use and continuance intention to use of broadband televisions users. From customers' perspectives for vendor's service and personal psychology perspectives, this study investigates what cognitive perspectives determine the continuance intention to use of broadband television users and endeavors to elucidate users' current conditions from theoretical perspectives.

Literature review and hypotheses

IPTV

The International Telecommunications Organization (International Telecommunications Union (ITU)) defines IPTV as "the use of IP technology delivering multimedia services." A multimedia service includes television, video, audio, text, photographs, and other information (Communication and Components Magazine, 2009). Wright *et al.* (2008) defined IPTV as a network that transmits the integration of communication, computer, and content services through internet protocols. Furthermore, Jain (2005) and Maisonneuve *et al.* (2009) stated that IPTV, using the internet as its foundation, transmits on demand video programs and broadcasts and directly connects to the televisions or computers of customers by accessing broadband internet provided by operators. Numerous studies have stated that IPTV transmission links bases on IT (Agarwal and Karahanna, 2000; Davis, 1989; Davis *et al.*, 1992; Venkatesh, 2000).

Delineating the standard developmental model of IPTV, Maisonneuve *et al.* (2009) found that the primary characteristics and technologies of IPTV have substantially developed in recent years. It predicted that the number of global IPTV users would reach a target of 70 million in 2014 (Informa Telecoms and Media, 2010). IPTV industries are seeking an opportunity to increase their income, which could only occur with IPTV application and acceptance from consumers (Casier *et al.*, 2008). Recently, numerous scholars have investigated determinants of consumers' continuance intention to use IPTV, contributing their research findings to IPTV industries (Casier *et al.*, 2008; Ha and Yook, 2009; Shin, 2007a, 2009a).

Relationships among perceived system quality, perceived ease of use, and attitude to use

Concepts of perceived system quality were proposed by Delone and McLean (1992), Rai, Lang and Weiker (2002), and Teo and Choo (2001). In addition to its crucial role in ISS, the type of perceived quality is a critical predisposing factor in the tricomponent attitude model for understanding the cognitive attitudes of broadband television users. Kim *et al.* (2008) investigated users' levels of technology acceptance for hotel front office systems, and the results showed that perceived system quality has a significant and positive effect on perceived ease of use. Liao and Cheung (2001) studied the attitude to use of consumers in online purchasing; advocating that high-standard system quality positively affects perceived ease of use among internet users. Furthermore, Ahn *et al.* (2007) and Cheong and Park (2005) demonstrated that perceived system quality has a significant and positive effect on perceived ease of use. Therefore, according to the relationship between perceived system quality and perceived ease of use, we propose the following hypothesis:

H1. The perceived system quality of broadband television users has a significant and positive effect on perceived ease of use.

System quality is a crucial dimension in the tricomponent attitude model. When a video in a system is frequently interrupted, delayed, lost, or lacks security and reliability, consumers who experience and are influenced by these issues are unwilling to use the system. Therefore, system quality is especially important in IS (DeLone and McLean, 1992; Lee 1999; Lin and Lu, 2000). In studies regarding the indirect effects in the relationship between perceived system quality and attitude to use, previous studies have indicated that various exogenous variables (e.g. technical support) indirectly affect users' attitudes through perceived ease of use (Davis *et al.*, 1989; Ngai *et al.*, 2007; Szajna, 1996). Conversely, regarding studies of direct effects, Shih (2004b) and Shin (2007b) have shown that perceived system quality has a significant and positive effect on users' attitudes. Therefore, based on the relationship between perceived system quality and attitude to use, we propose the following hypothesis:

H2. The perceived system quality of broadband television users has a significant and positive effect on attitude to use.

In studies regarding the relationship between perceived ease of use and usage attitude, perceived ease of use refers to the degree to which individuals believe that using a special system enables them to easily obtain pleasure, both psychologically and physiologically (Cheong and Park, 2005; Oh *et al.*, 2009). Furthermore, Davis *et al.* (1989) compared two theoretical models to study users' acceptance of computer technologies. They defined perceived ease of use as the degree to which users can easily employ a certain system without exerting significant effort while achieving their desired results or performance. In an empirical study that predicted the acceptance levels of online purchasing users, Shih (2004b) divided perceived ease of use into two sections: perceived ease of use regarding the internet (i.e. ease of web page browsing), and perceived ease of use for online trading or transactions (i.e. ease of use during online transactions). The results indicated that perceived ease of use for online transactions has a significant and positive effect on attitude to use, but that perceived ease of use for web browsing does not significantly affect attitude to use. Van der Heijden *et al.* (2003) studied online purchasing intentions and showed that perceived ease of use has a significant and positive effect on attitude to use. Ngai *et al.* (2007) investigated users' acceptance of internet course tools, and the results demonstrated that perceived ease of use has a significant and positive influence on attitude to use. In previous studies regarding TAM, numerous studies have verified that perceived ease of use directly affects people's attitude to use (Ahn *et al.*, 2004; Bruner and Kumar, 2005; Chen *et al.*, 2002; Cheong and Park 2005; Davis *et al.*, 1989). Therefore, based on the relationship between perceived ease of use and attitude to use, we propose the following hypothesis:

H3. Perceived ease of use among broadband television users has a significant and positive effect on attitude to use.

Relationships between perceived content quality and attitude to use

In the field of IS, system quality, information quality, and service quality have specific relevance with people regarding particular quality attributes (Bailey and Pearson, 1983; DeLone and McLean, 1992; McKinney *et al.*, 2002). Furthermore, in the tricomponent attitude model, information quality is a predisposing factor in the development of positive attitudes among broadband users. Therefore, from a conceptual perspective, perceived content quality is similar to information quality. This is because information

quality is frequently hidden within the context of perceived content on the internet (DeLone and McLean, 1992; Lin and Lu, 2000). Lin and Lu (2000) investigated the factors that affect users' intention to use the internet, subsequently advocating that perceived content quality is a predictive factor of consumer behavior, and content quality is a useful measurement dimension. When a system becomes complex, perceived content quality as an important measurement dimension is superior to that of information quality.

In a study regarding the relationship between perceived content quality and attitude to use, Beyah *et al.* (2003) found that perceived content quality has a significant and positive effect on attitude to use. Cheong and Park (2005) studied users' acceptance of mobile internet in South Korea. The results showed that good content quality causes mobile internet consumers to develop pleasure and enjoyment, suggesting that perceived content quality has a significant and positive effect on perceived usefulness. Shin (2009b) advocated that excellent video content create feelings of pleasure, interest, and enjoyment in consumers, which subsequently influences user attitudes. The study further suggested that perceived content quality has a significant and positive influence on user attitudes. Based on the relationship between perceived content quality and usage attitude, we propose the following hypothesis:

H4. The perceived content quality of broadband television users has a significant and positive effect on attitude to use.

Relationships between customization and attitude to use

Shin (2009b) investigated factors that influence consumers regarding the acceptance of multimedia networking. The results demonstrated that satisfying the preferences and demands of consumers is the central task for relevant industries. In e-commerce, customization entails satisfying customers and meeting their requirements (Li and Yeh, 2009). Customization has been defined as an environment tailoring products, services, and transactions to specific customers (Srinivasan *et al.*, 2002). From a customer's perspective, customization means greater variety and preferred products (Tsai and Huang, 2007). In a study regarding e-commerce, Rayport and Jaworski (2001) showed that the concept of customization indicates providing service content based on users' preferences and specifications. Although researchers have various backgrounds and academic fields, customization regarding research targets (i.e. users) transforms each user into a "special or key account" and provides unique and varied usage content to satisfy the specific needs of the user (Gilmore and Pine, 2000). Kalyanaraman and Sundar (2006) showed that the customized content of web portals positively affects users' attitudes. Franke *et al.* (2009) proposed that customers who have identified their needs could express their preferred and frequently used products or products with which they have a high level of involvement. Consequently, consumers have developed a more positive usage attitude toward their products. Therefore, we propose the following hypothesis:

H5. The customization of broadband television has a significant and positive effect on attitude to use.

Relationships between perceived price level and attitude to use

Lee (1999) and Zeithaml (1988) verified that perceived price level is a fundamental factor that influences consumers' cognition. When the products or services provided by industries are overpriced, or the price is higher than the benefits of the products provide, this price or price effectiveness influences the consumers' attitude to use.

Wu and Wang (2005) studied the factors that affect mobile commerce behaviors and found that perceived price level is a primary factor that shapes consumers' attitude to use. In a study regarding users' acceptance of mobile internet in South Korea, Cheong and Park (2005) indicated that perceived price level has a negative effect on consumers' attitude to use. Similarly, Shih (2004b) elucidated various factors that influence and predict consumers' acceptance of online purchasing, indicating that perceived price level has a negative effect on consumers' attitude to use. Therefore, we propose the following hypothesis:

H6. The perceived price level of broadband television has a significant and negative effect on attitude to use.

Relationships between perceived risk and attitude to use

Previous studies have used inferences and empirical methods to propose that risks are critical factors that affect consumers' decisions (Featherman and Pavlou, 2003; Fraedrich and Ferrell, 1992; Jacoby and Kaplan, 1972; Mitchell, 1992; Pavlou, 2003). Shin (2009b) and Weniger (2010) have indicated that consumers are especially concerned with risks related to utilizing IPTV, which influences their willingness to use this product. In comparison with other factors, their study suggested that risks are a primary concern of broadband television users.

Risk cognition focusses on people's evaluations, behaviors, and options (Campbell and Goodstein, 2001). In a study regarding the relationship between perceived risk and attitude to use, Liao *et al.* (2010) elucidated the factors that influence and predict the usage of private software. The results showed that perceived psychological risk has a significant and negative effect on attitude to use. Van der Heijden *et al.* (2003) studied the factors that affect the intention to make purchase decision, demonstrating that perceived risk has a significant and negative effect on attitude to use. In a study regarding C2C in electronic markets, Verhagen *et al.* (2006) similarly demonstrated that sellers' perceived risk has a significant and negative effect on consumers' purchasing attitudes. Therefore, we propose the following hypothesis:

H7. The perceived risk regarding broadband television has a significant and negative effect on attitude to use.

Relationships between attitude to use and continuance intention to use

Davis (1989) suggested that when users' attitudes toward an information system become increasingly positive, their behavioral intention to use the information system increases. Based on TAM, attitude affects behavioral intention in the relationships among beliefs, attitudes, intentions, and behaviors (Chen and Tan, 2004). The original purpose of TAM is to explain the initial technology acceptance of users. It is mainly to explore the issue of users' continuance use. Therefore, behavioral intention in the original TAM is as IS continuance intention and is suitable for exploring IS continuance context (Liao *et al.*, 2009).

Bosnjak *et al.* (2006) confirmed the behavior patterns of users regarding online auctions and showed that the attitude to use of online auction participants regarding internet systems affect behavioral intentions. Furthermore, Agarwal and Prasad (1999) and Swanson (1982) have advocated that users' attitudes affect users' continuance intention to use IT. Therefore, we propose the following hypothesis:

H8. The attitude to use of broadband television users has a significant and positive effect on continuance intention to use.

Methodology

Research model

This study employs the tricomponent attitude model proposed by Rosenberg and Hovland (1960), as the theoretical basis for the proposed framework. This study derived the proposed model from the three phases of psychological processes: cognition, affection, and conation.

First, cognition constitutes people's knowledge and faith regarding a particular object. According to Shin (2009b), who investigated the development of IPTV services, industries must overcome four obstacles (i.e. perceived system quality, perceived content quality, perceived ease of use, and perceived price level), and use these obstacles as determinants of the intentions of consumers regarding the use of IPTV applications.

Furthermore, the exogenous variables for this study bases on Teng (2010), who showed that customization enhances users' immersion regarding online gaming. Service characteristics provided for broadband users demonstrate similar phenomena. Previous studies on customization have focussed on mass customization (Teng, 2010). However, customization's influence on consumers' behavioral decisions is unknown. Additionally, previous studies (e.g. Featherman and Pavlou, 2003) have indicated that perceived risk is a critical factor that influences consumers regarding decision making. Consequently, in addition to the four factors: perceived system quality, perceived content quality, perceived price level, and perceived ease of use, this study investigated two cognitive perspectives: customization and risk.

Second, affection denotes subjective emotions (e.g. like, dislike, love, and hate) that are triggered by an object. The affection of users is the most difficult aspect of attitude to modify. Although the cognition of a certain object can change, stimulating emotions or affection that promotes the acceptance of an object is difficult. However, if affection does not change, decision-making behaviors cannot transform. Therefore, methods for altering the attitude to use of broadband television users play a crucial mediating role in linking cognition and behavior.

Third, conation is the behavioral tendencies of an individual toward an object. In previous studies investigating IPTV topics, Ajzen and Fishbein (1980) asserted that, when determining consumer behavioral models, one could employ intentions to predict and affect consumers' usage behaviors. These intentions refer to users' intention to perform an action based on their beliefs or emotions (Arnould *et al.*, 2004; Rosenberg and Hanland, 1960). Because intentions are similar to actions (Ajzen and Fishbein, 1973), we investigated the continuance intention to use of users to represent the conation phase.

Consequently, this study developed a comprehensive model to predict the continuance intention to use of broadband television users. Based on the aforementioned assertions, Figure 1 shows the framework of this study.

Data collection procedure and participants

The ITU announced the global digital pipeline index appraisal Taiwan in the global rankings in ninth and third place in Asia. It shows that the development of Taiwan's IT Telecom Technology has put it in a leading position (EpochTimes.com, 2003). Taiwan's main development of IPTV industry, led by Chunghwa Telecom and Chunghwa Telecom's MOD, is currently Taiwan's largest IPTV provider. The number of IPTV subscribers worldwide will exceed 102,000,000 in 2014 with the estimation of revenue

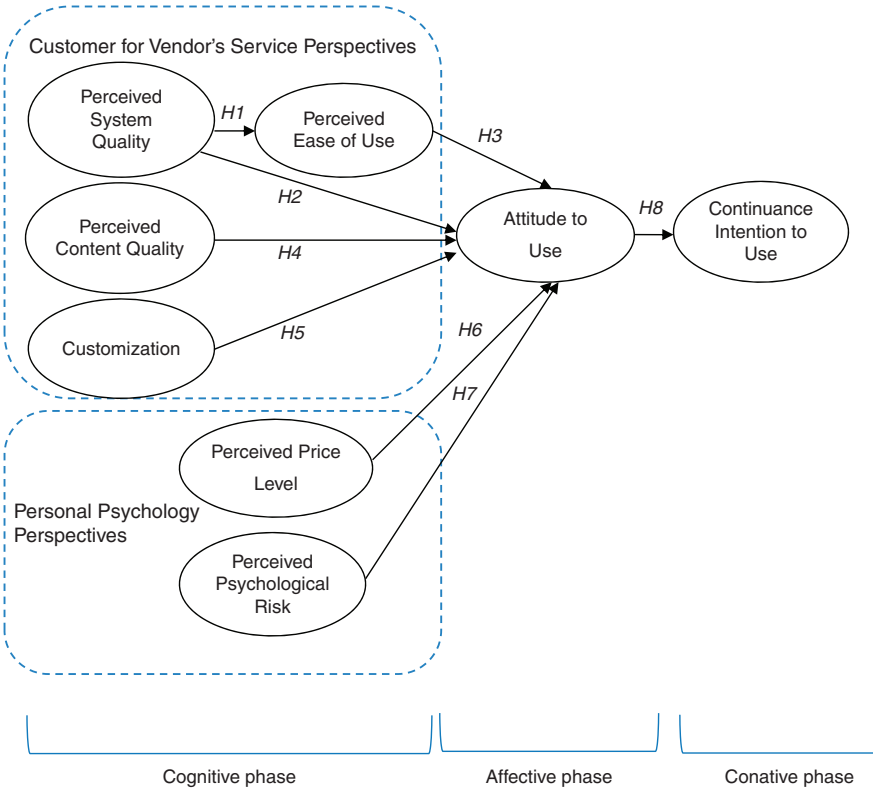


Figure 1.
Proposed model

from 2010 of the total global revenues of $17.5 billion US dollars, growing to $46 billion US dollars in 2014.

In this optimistic boom, the Chunghwa Telecom broadband network operators have the advantage (4,340,000 users, and a market share of 84.6 percent). MOD was developed in 2002, and the number of the official users was more than 820,000 in 2004; with a share of the digital TV market reaching 67.6 percent, the future number of users will continue to grow (The Foundation for Excellent Journalism Award, 2013). Accordingly, this research sample bases on Chunghwa Telecom's MOD users, and the use time of watching MOD is at least one hour or more per week. This study conducted a two-stage survey for the content validity of questionnaire. The first stage, before the implementation of the survey, this study interviewed 21 respondents of Chunghwa Telecom's MOD users one-by-one to modify the contents and wordings of questionnaire items. The second stage, 100 respondents of Chunghwa Telecom MOD consumers reconfirmed and modified items. Finally, this study released the questionnaire to confirm the common method variance problem, convergent validity, discriminant validity and reliability for the pretest.

This study conducted the survey to Chunghwa Telecom MOD's users from November 1 to November 26 of 2012 for the pretest. There were 206 valid samples and 71 invalid samples with total 277 samples in the pretest. The valid sample rate was 74.37 percent. The composite reliability (CR) and average extracted variance (AVE) displayed the convergent validity of measurement model. This study distributed the

formal survey on December 15, 2012 and ended on February 28, 2013. This study received 983 samples. However, this study deleted samples that were missing, incomplete, or inconsistent. The total valid samples were 631, and the valid rate was 64.19 percent.

The male and female ratio of samples was 60.9 and 39.1 percent, respectively. The users are mainly between 41 and 60 years old (67.2 percent). 63.7 percent of the samples were educated to above university degree level. 85.6 percent of users had more than one year of experience in this study. The percentage of average monthly subscription fees spent on Chunghwa Telecom MOD was 61.5 percent more than 130,000 NT dollar, followed by 90,000 to 129,000 NT dollars (23.4 percent) and 89,000 NT dollars (15.1 percent).

Measurement development

Appendix illustrates the constructs' measurements of this study. Perceived system quality, perceived content quality, customization, perceived ease of use, perceived price level, perceived risk, attitude to use, and continuance intention to use scales were measured using a seven-point Likert scale (1 for strongly disagree and 7 for strongly agree). This study designed some of the items in the questionnaire in reverse to prevent consistent responses.

Perceived system quality and perceived content quality

This study divided perceived quality into two dimensions: perceived system quality and perceived content quality. Perceived system quality was defined as "Chunghwa Telecom MOD provides sufficient network bandwidth and reliable network qualities for transmitting video services." The measurement items of perceived system quality were based on items proposed by Cheong and Park (2005). Because the concepts of information quality and perceived content quality are similar (i.e. on the internet, information quality is frequently hidden or included within perceived content) (DeLone and McLean, 1992; Lin and Lu, 2000), perceived content quality was defined as "Chunghwa Telecom MOD provides diverse programs and information services that can satisfy consumers' demands." The measurement items of perceived content quality were based on items proposed by Shin (2009b).

Customization

To match the research context for this study, this study used service quality, as suggested by ISS (DeLone and McLean, 2003), and modified it to relate with customization service. Customization was defined as "Chunghwa Telecom MOD can customize personal preferences, for example: personalized programs and other application services." The measurement items of customization were based on items proposed by Teng (2010).

Perceived price level

Perceived price level was defined as "the degree of expense for utilizing the viewing and information services of Chunghwa Telecom MOD." The measurement items of perceived price level were based on items proposed by Shin (2009b).

Perceived risk

Perceived risk was defined as "Chunghwa Telecom MOD provides programs and services that create the mistakes risk and technical risk." The measurement items were based on items proposed by Liao *et al.* (2010).

Perceived ease of use

Perceived ease of use was defined as "consumers who use Chunghwa Telecom MOD can easily acquire their preferred programs or video services." The measurement items were based on items proposed by Van der Heijden *et al.* (2003).

Attitude to use

Attitude to use was defined as "consumers' degree of attitude to use, participation willingness, and preferences regarding Chunghwa Telecom MOD." The measurement items were based on items proposed by Shin (2009b).

Continuance intention to use

Continuance intention to use was defined as "consumers' intentions continuously use Chunghwa Telecom MOD." The measurement items were based on items proposed by Shin (2009b).

Common method variance

Use of self-reported data is a common practice in management research. Self-reported data on two or more variables collected from the same source may possibly lead to a common method variance problem. In order to evaluate the threat of common method variance problem, this study adopted the way of Hsu *et al.* (2013) to conduct Harman's one factor test (Harman, 1967; Podsakoff and Organ, 1986). This test assumes that if a high level of the common method variance is present, then when all of the variables are entered together, they will load on one single factor that will account for all of the variance, or one factor will account for a majority of the variance. This study performed an exploratory factor analysis and seven factors with an eigenvalue > 1. The first factor of variance explained only 42.218 percent of the total variance. The test results provide evidence that the common method variance should not be a concern in this study.

Data analysis and result

This study used AMOS software of 17 versions to conduct the confirmatory factor analysis (CFA) of measurement model and structural model.

Measurement model

Following procedures recommended the CFA of the measurement model based on the convergent validity analysis guidelines suggested by Anderson and Gerbing (1988). Bagozzi and Yi (1988) proposed the evaluation criteria of CFA. Gefen *et al.* (2000) suggested the goodness-of-fit indicators. The measurement model showed good levels of fit: $\chi^2/\mathrm{df} = 2.656$, goodness-of-fit index (GFI) $= 0.889$, comparative fit index (CFI) $= 0.956$, and root mean square error of approximation (RMSEA) $= 0.051$.

Table I shows that results of the measurement model indicate good convergent validity. It indicates that CR and average variance extracted for each dimension is higher than 0.7 and 0.5, respectively. This research used the criteria of Gaski and Nevin (1985) to test discriminant validity. The correlation coefficient between two dimensions is < 1. The correlation coefficient of two dimensions is smaller than the square root of the average variance extracted for each dimension. This study indicates adequate discriminant validity. Table II shows that correlation matrix between dimensions presents adequate discriminant validity. This implies that this study is suitable for structural model analysis.

Constructs	MLE estimates: Factor loading (λ_x/λ_y)	MLE estimates: Measurement error (δ/ε)	Squared multiple correlation (SMC)	Composite reliability (CR)	Average of variance extracted (AVE)
Perceived system quality				0.902	0.754
SQ1	0.854***	0.270	0.730		
SQ2	0.931***	0.133	0.867		
SQ3	0.816***	0.487	0.665		
Perceived content quality				0.889	0.729
CQ1	0.828***	0.327	0.673		
CQ2	0.910***	0.177	0.823		
CQ3	0.820***	0.315	0.685		
Customization				0.782	0.546
CU1	0.679***	0.538	0.462		
CU2	0.827***	0.316	0.684		
CU3	0.703***	0.506	0.494		
Perceived ease of use				0.911	0.674
PEOU1	0.808***	0.346	0.654		
PEOU2	0.700***	0.507	0.491		
PEOU3	0.845***	0.286	0.714		
PEOU4	0.881***	0.223	0.777		
PEOU5	0.857***	0.266	0.734		
Perceived price level				0.830	0.934
PPL1	0.891***	0.205	0.795		
PPL2	0.929***	0.137	0.863		
PPL3	0.912***	0.186	0.814		
Perceived risk				0.912	0.776
PR1	0.900***	0.190	0.810		
PR2	0.917***	0.159	0.841		
PR3	0.823***	0.323	0.677		
Attitude to use				0.922	0.798
ATTU1	0.864***	0.254	0.746		
ATTU2	0.913***	0.161	0.839		
ATTU3	0.902***	0.187	0.813		
Continuance intention to use				0.912	0.784
CIU1	0.923***	0.152	0.848		
CIU2	0.929***	0.149	0.851		
CIU3	0.798***	0.363	0.637		
Fit statistics ($N = 631$)					
$\chi^2 = 1495.081$					
DF = 563					
GFI = 0.889					
CFI = 0.956					
RMSEA = 0.051					

Note: ***All factor loadings are significant at the $p < 0.001$ level

Table I.
Analysis of measurement model

Constructs	PSQ	PCQ	CU	PEOU	PPL	PR	ATTU	CIU
PSQ	*0.868*							
PCQ	0.518	*0.854*						
CU	0.396	0.447	*0.739*					
PEOU	0.347	0.444	0.342	*0.821*				
PPL	−0.259	−0.288	−0.188	−0.340	*0.966*			
PR	−0.557	−0.368	−0.322	−0.325	0.226	*0.881*		
ATTU	0.621	0.622	0.413	0.398	−0.263	−0.359	*0.893*	
CIU	0.656	0.549	0.398	0.377	−0.275	−0.421	0.809	*0.885*

Table II.
Correlation matrix for measurement scales

Notes: PSQ, perceived system quality; PCQ, perceived content quality; CU, customization; PEOU, perceived ease of use; PPL, perceived price level; PR, perceived risk; ATTU, attitude to use; CIU, continuance intention to use. Diagonal elements are the square roots of the average variance extracted

Structural model

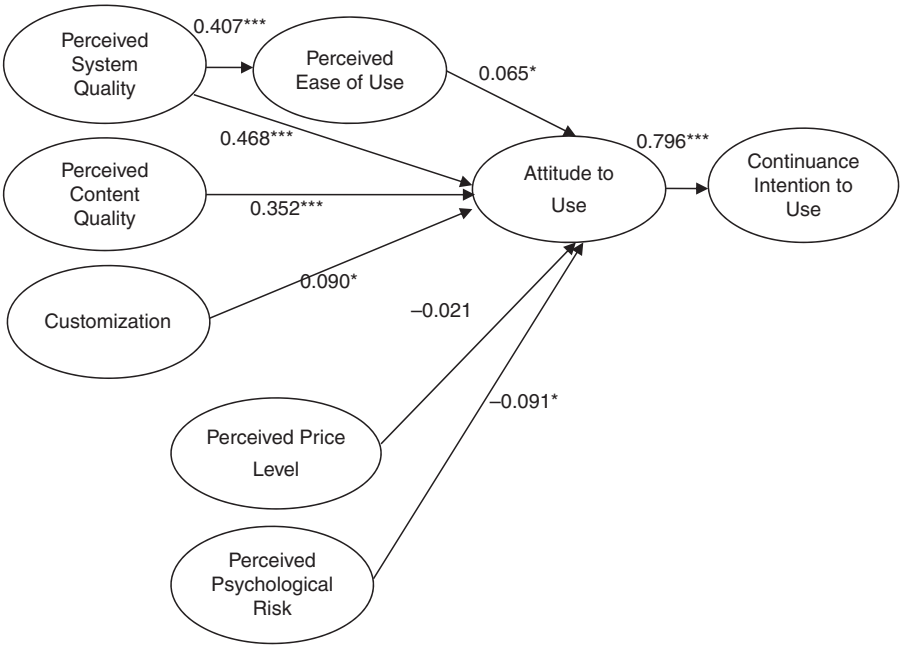
This structural model showed adequate fit: $\chi^2/df = 3.00$, GFI = 0.900, non-normed fit index (NFI) = 0.932, CFI = 0.954, incremental fit index (IFI) = 0.954 and RMSEA = 0.056 (Baumgartner and Homburg, 1996).

Table III and Figure 2 shows that *H1* was supported ($\gamma_{11} = 0.407$, $p < 0.001$), which means that the perceived system quality of broadband television users has a significant and positive effect on perceived ease of use. *H2* was supported ($\gamma_{21} = 0.468$, $p < 0.001$). This suggests that the perceived system quality of broadband television users has a significant and positive effect on attitude to use. *H3* was supported ($\beta_{21} = 0.065$, $p < 0.05$), implying that perceived ease of use of broadband television users has a significant and positive effect on attitude to use. *H4* was supported ($\gamma_{22} = 0.352$, $p < 0.001$). This indicates that the perceived content quality of broadband television users has a significant and positive effect on attitude to use. *H5* was supported ($\gamma_{23} = 0.090$, $p < 0.05$), meaning that the customization of broadband television users has a significant and positive effect on attitude to use. *H7* was supported ($\gamma_{35} = -0.091$, $p < 0.05$), which suggests that the perceived risk regarding broadband television users has a significant and negative effect on attitude to use. *H8* was supported ($\beta_{32} = 0.796$, $p < 0.001$), indicating that the attitude to use of broadband television users has a significant and positive effect on continuance intention to use. However, *H6* was not supported.

Hypothesis relationship			Path coefficients	Hypotheses	Test results
γ_{11}	Perceived system quality	→ perceived ease of use	0.407***	*H1*	Supported
γ_{21}	Perceived system quality	→ attitude to use	0.468***	*H2*	Supported
β_{21}	Perceived ease of use	→ attitude to use	0.065*	*H3*	Supported
γ_{22}	Perceived content quality	→ attitude to use	0.352***	*H4*	Supported
γ_{23}	Customization	→ attitude to use	0.090*	*H5*	Supported
γ_{24}	Perceived price level	→ attitude to use	−0.021	*H6*	Not supported
γ_{35}	Perceived risk	→ attitude to use	−0.091*	*H7*	Supported
β_{32}	Attitude to use	→ continuance intention to use	0.796***	*H8*	Supported

Table III.
Results of proposed model

Notes: Perceived ease of use $R^2 = 0.166$; attitude to use $R^2 = 0.603$; continuance intention to use $R^2 = 0.719$. Fit index: $\chi^2 = 990.358$, df = 330, goodness-of-fit index (GFI) = 0.900, non-normed fit index (NFI) = 0.932, comparative fit index (CFI) = 0.954, incremental fit index (IFI) = 0.954, root mean square error of approximation (RMSEA) = 0.056. ***$p < 0.001$; *$p < 0.05$



Notes: ***$p<0.001$; *$p<0.05$

Figure 2.
Structural model results

Discussion

Conclusion

This study employed the tricomponent attitude model to investigate critical factors that can determine consumers' continuance intention to use of broadband television and, subsequently, constructed relationship models for these factors. Regarding theoretical perspectives and extensions of theory, we utilized the theory proposed by DeLone and McLean (1992) and divided it into two cognition perspectives. The variables considered in the customers' perspectives for vendor's service were perceived system quality, perceived content quality, customization, and perceived ease of use. The variables in the personal psychology perspective included perceived price level and perceived risk. This study integrated these two groups' variables of customers' perspectives for vendor's service and personal psychology cognitions, and subsequently used to clarify the cognitive, affective, and conative phases of broadband television users. The results of this study not only elucidate the relationships between the customers' perspectives for vendor's service perspectives and attitude to use of users, but confirm the relationship between perceived risk (a personal psychology perspective) and users' continuance intention to use IPTV.

From customers' perspectives for vendor's service, the study showed that the level of perceived system quality, perceived content quality, perceived ease of use, and customized service content affect the attitude to use of users. These results correspond with those of previous studies (e.g. DeLone and McLean, 1992, 2003; Shin, 2009b). Regarding the personal psychology perspective, the results showed that perceived price level does not affect the attitude to use of users. This finding can explain the potential presence of consumers who are exceptions to the general rule and focus more

value on the quality of technological products than on price (which becomes a secondary factor of consideration). In addition, numerous studies have examined perceived risk. These studies have suggested that risk is a key factor that influences consumers in making decisions (Featherman and Pavlou, 2003; Franke *et al.*, 2009), affecting the attitude to use of broadband television users.

Regarding the attitude-conation relationship, this study demonstrated that the attitude to use of consumers affect their usage intentions. This result corresponds to those of previous studies (e.g. Agarwal and Prasad, 1999; Swanson, 1982) and indicates that consumers' attitude to use is a crucial factor for predicting their usage intentions. In particular, the majority of Taiwanese people used to watch TV with multi-channel and good state. The biggest bottleneck to the promotion of digital TV at this stage is how to switch consumers watching habits on cable television to MOD effectively.

Managerial implications

The results indicated that perceived system quality for services provided by IPTV industries is especially crucial. For example, when IPTV promptly transmits video data, perceived system quality must be stable. If the quality is unstable, packets are lost or delayed, resulting in disconnection and the loss of data – negatively influencing consumers' interests and benefits. Therefore, service provider should focus on building high-quality transmission networks and should rapidly enhance the infrastructure of telecommunication networks using "Fiber-to-the-Home" (FTTH) as a foundation. Consequently, service provider can deliver sufficient network bandwidth and a reliable video service quality to consumers. Therefore, broadband television industries should first enhance user interfaces for consumers, that is, they should simplify the MOD operation interface. According to traditional television markets, most people who watch television are elderly people (more than 65 years old) and preschool children. Simplifying the MOD operation interface should facilitate the enhancement of consumers' positive attitude to use.

Regarding perceived content quality, broadband television industries should enhance the comprehensiveness and precision of program content. TV companies should supplement features that consumers prefer or require, such as high definition, critical programs, and applied information and service channels (e.g. news and weather forecasting, gaming, daily entertainment and information, home banking and ATM services, and shopping programs). These programs facilitate consumers' experiences related to the convenience of a digital lifestyle, thereby enhancing their intentions to use these programs and their actual usage behaviors. In summary, this research recommends that service providers continue to strengthen the MOD contents in the future and quickly provide the popular movies in order to snatch the customers of the video rental industry. In addition, the service providers should provide more diversified contents to meet different consumer needs, such as finance, leisure, learning and living, and continually simplify the operating system for the elderly and young children to use.

Customized services provided by Chunghwa Telecom MOD target various customer types. These services provide a variety of customized products, such as family benefits packages, family value packages, student packages, and no-internet MOD and community package systems. Chunghwa Telecom MOD continuously enhances its customized services, which can efficiently distinguish broadband television from traditional cable television. Therefore, the service provider should not only enhance the hardware and software, but also pay attention to the attitude of customer service.

Especially the counter staff in direct contact with customers, MOD equipment installation engineering staff, and customer service personnel should handle customer problems quickly to meet customer needs, in order to further enhance the customers' expectation level of service quality.

Regarding the personal psychology perspective, for risk management, industries have applied a closed network framework to card readers constructed in MOD set-top boxes (STBs). Consequently, hackers are unable to invade and inject malicious Trojan programs into these STBs, thereby allowing industries provided family ATM or banking services. Family ATMs for MOD users accept debit cards with computer chips from any bank, and can operate by using a remote control. Users can perform banking activities according to the instructions on their television screens. Thereby, users process various banking services (e.g. balance inquiries, payments, and transfers) securely and conveniently. This will inevitably become a new experience model for future broadband television users.

In establishing the customer positive attitude and continue intention to use, the marketing strategy of the Tivo corporations, which developed interactive television, enables customers to experience novel and diverse TV technology firsthand, is more effective than advertising. Therefore, experiential marketing recommends customers to use novel and diverse TV technology. For example, vendors should establish a section in their store or organize events where consumers can experience broadband television. Broadband television industries should allow marketers to visit customers' homes where they can personally demonstrate the advantageous features of broadband televisions, allowing customers to experience the benefits of next generation digital audio and visual services. It is an important issue how to increase consumers' acceptance and willingness to buy by developing a successful interactive TV platform of MOD. To increase consumers acceptance and willingness to buy, not only the product attributes need to strengthen the content and service quality and possess product differentiation with other features and benefits, but also the innovative product need its function and value to fit consistent with previous consumers culture and habits, making consumers more user friendly and increasing the comfort level of consumers use the product. Service providers can satisfy consumers' needs with product attributes, such as: the product has utilitarian attributes, can provide consumers to resolve problems or enable consumers to achieve a function or task, and users can learn English and mathematical knowledge through the MOD learning channel. In hedonic attributes, to create the sense of pleasure, fantasy, and joyful of feelings for users, such as: MOD service provider gives more variety entertainment, information channels, diversification additional functions, higher quality of audio and movie, or family ATM functions, are the key factors for consumers decisions to continue to use in the future.

Research contributions

There are more and more researchers exploring the main factors affecting the intention of use of technology adoption among users in the individual and organizational contexts (Martins *et al.*, 2014). In the past, most of the research has focussed on areas of IS/IT literature for the IT adoption of IT. To illustrate this research gap, this study provided a conceptual model to contribute the adoption theory by incorporating customers' perspectives for vendor's service and personal psychology cognition perspectives and investigated the effects of cognition perspectives on the attitude to use and the behaviors of broadband television users. It provides a more comprehensive

view of users' behavior intention for broadband televisions. Therefore, the theoretical basis of this study mainly integrated the view of tricomponent attitude model. The main purpose is to integrate the theoretical perspectives of TAM without considering the personal psychology perspectives, rather than simply the point of view of the vendor's service of TAM. Many studies focussed on the users' intentions to adopt telecommunications technologies, including dial-up internet services, mobile phones, etc., and most of these based on Davis's (1989) TAM model or its extensions (Hill *et al.*, 2011). However, it has a drawback, even though it has the advantage of simplicity due to it explaining the limitation of the information of the users' acceptance services adoption intention (Davis, 1989; Venkatesh and Davis, 2000). Therefore, this study proposed to integrate the objective perspectives of personal psychology (perceived risk and perceived price level) in addition to considering customers perspectives for vendor's service (i.e. perceived system quality, perceived content quality, customization, and perceived ease of use). These factors are crucial precedent factors for enhancing customers' positive attitude to use and continuance intention to use.

Limitations and directions

First, this study applied the cross-sectional survey method. As broadband television industries are continuously promoting novel technologies and information services, this may cause measurement bias on time points. Scholars can employ the longitudinal survey method in future studies. For example, in the past, studies mostly investigated users' persistent problems with single stage test at one point time (Liao *et al.*, 2009). This study recommends that future research should divide into three stages: initial adopters, short-term users, and long-term users in order to strengthen the robustness of study. Second, this study differentiated exogenous variables into customers' perspectives for vendor's service and personal psychology perspectives to investigate the actual usage behaviors of broadband television users. However, this study did not incorporate individual characteristics, demographic variables, or other possible theories, such as perceived habits (e.g. Liao *et al.*, 2010), media communication theories, and issues regarding the interactions of human-machine interfaces. Scholars should include the mentioned characteristics and theories in future studies, comprehensively verifying users' decision-making behaviors regarding the use of broadband products. Third, the perceived risk variable in this study affected broadband television users. However, this study only considered psychological risk, and did not concern other potential and perceived risk, such as financial, performance, and time risk (e.g. Liao *et al.*, 2010). Therefore, detailed studies can focus on various perceived risk for broadband television users, which will facilitate the prediction of effects on broadband television users' decision-making behaviors, and consequently broaden the applications and comprehensiveness of relevant research. Fourth, this empirical result cannot generalize to other countries. The respondents were particular for Chunghwa Telecom MOD in Taiwan. Fifth, although Ajzen and Fishbein (1973) advocated that behavioral intention approximated to actual behavior, it still needed to effectively differentiate their differences in the theory of reasoned action. It could expect that behavioral intention had a significant and positive influence on technology usage of the research of intention models of technology adoption in the past (Martins *et al.*, 2014; Venkatesh *et al.*, 2003). This study recommends that future research measure behavioral intention and actual use behavior separately to command the actual behavior of users more accurately. Finally, this research is only for the largest IPTV provider, Chunghwa Telecom's MOD. The results cannot generalize to other

countries in Europe or the USA. Therefore, future research can investigate different countries (USA and countries in Europe). The social and cultural dimensions (Al-Debei and Al-Lozi, 2014) of the market and the understanding of personal habits can effectively help telecoms service providers to develop appropriate MOD services effectively, promote these services efficiently, and set realistic adoption targets. This study recommends that whether there are differences in gender, national cultural influences, the use of personal habits, and other issues, is an ideal area for future research.

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(The appendix follows overleaf.)

Appendix

Construct/items
Perceived system quality (Cheong and Park, 2005)
PSQ1. I think that the Chunghwa Telecom's MOD provides very reliable service
PSQ2. I think that the speed of Chunghwa Telecom's MOD is fast
PSQ3. I think that the Chunghwa Telecom's MOD is secure to use
Perceived content quality (Shin, 2009b)
PCQ1. Chunghwa Telecom's MOD provides various information and services
PCQ2. The services and information I can get from Chunghwa Telecom's MOD is valuable
PCQ3. Chunghwa Telecom's MOD provides the information and services that I need
Customization (Teng, 2010)
CU1. The Chunghwa Telecom's MOD enables users to customize personal needs
CU2. The Chunghwa Telecom's MOD e enables users to customize the installation way for select the installed capacity
CU3. The Chunghwa Telecom's MOD enables users to create customized television program for their preference
Perceived ease of use (Van der Heijden *et al.*, 2003)
PEOU1. Learning to use the Chunghwa Telecom's MOD is easy
PEOU2. It is easy to get the Chunghwa Telecom's MOD to see what I want
PEOU3. The interactions with the Chunghwa Telecom's MOD are clear and understandable
PEOU4. The Chunghwa Telecom's MOD is convenience to get TV information
PEOU5. The Chunghwa Telecom's MOD is easy to use
Perceived price level (Shin, 2009b)
PPL1. Using the Chunghwa Telecom's MOD is expensive in overall
PPL2. The price level of using the Chunghwa Telecom's MOD is a burden to me
PPL3. The price level of using special service or information through the Chunghwa Telecom's MOD is expensive to use
Perceived risk (Liao *et al.*, 2010)
PR1. Using the Chunghwa Telecom's MOD makes me feel psychologically uncomfortable
PR2. Using the Chunghwa Telecom's MOD gives me a feeling of unwanted anxiety
PR3. Using the Chunghwa Telecom's MOD causes me to experience unnecessary tension
Attitude to use (Shin, 2009b)
ATTU1. Using the Chunghwa Telecom's MOD is good idea
ATTU2. Using the Chunghwa Telecom's MOD is beneficial to me
ATTU3. Using the Chunghwa Telecom's MOD is a positive idea
Continuance intention to use (Shin, 2009b)
ICU1. I will use the Chunghwa Telecom's MOD in the future
ICU2. I intend to use the Chunghwa Telecom's MOD as much as possible
ICU3. I will strongly recommend others to use the Chunghwa Telecom's MOD

Table AI.
Scale items

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