The effects of hedonic/utilitarian expectations and social influence on continuance intention to play online games

I-Cheng Chang

National Dong Hwa University, Hualien, Taiwan

Chuang-Chun Liu

Institute of Information Management, National Chiao Tung University, Hsinchu, Taiwan, and

Kuanchin Chen

Western Michigan University, Kalamazoo, Michigan, USA

Abstract

Purpose – The focus in this study is a model that predicts continuance intention of online multiplayer games. In this integrated model, the social cognitive theory (SCT) lays out the foundation of two types of pre-use (pre-play) expectations, the flow theory captures the affective feeling with the game as a moderator for the effect from the two pre-use expectations, and subjective norm together with its associated antecedents cover a wide spectrum of social influences.

Design/methodology/approach – A questionnaire was designed and pre-tested before distributing to target respondents. The reliability and validity of the instrument both met the commonly accepted guidelines. The integrated model was assessed first by examining its measurement model and then the structural model.

Findings – The integration of cognitive, affective and social influence in this model explains a larger amount of variance compared to the competing models and existing studies.

Originality/value – Unlike a popular trend that studies predictors of online games from either cognitive or affect angle, the work looks at both together to study how their joint effect is related to continuance intention. This marks an important improvement as cognitive expectations derived from SCT captures the pre-use experience that may be influenced or swayed by sources including those that are inflated or incorrect. By studying flow as a moderator in conjunction with other sources of influence, the authors are able to further the understanding of how the pre-use expectations may be shaped by one's own experience.

Keywords Online game, Flow theory, Social cognitive theory

Paper type Research paper

Introduction

As more and more of online games adopt human-to-human interactivity, the motivation for a gamer to play is rarely just the user interface of the game alone. As a result, the fantasy and entertainment experienced in online games is a combined effect out of several types of interactions, including the traditional human-to-machine interactivity delivered through the game's user interface and the human-to-human interactivity commonly seen in multi-player games. Therefore, a research model that leans on either side (human-to-machine or human-to-human) of interactivity may be limited to capture the broader motives of game continuance intention.

Despite the popularity of online games, not many studies have been conducted to explore the behavior of online game playing (Yee, 2006). Prior studies of online games

may be limited in some ways. First, some prior studies have overly emphasized on technical aspects to study game acceptance, neglecting both cognitive and affective perspectives that are commonly present in game playing. Second, descriptive experience reports add to our understanding of what has happened, but rarely offer enough of theoretical foundation to explain what and why things happened. Therefore, this study is designed to bridge existing theories with empirical experiences, specifically by extending existing theories. Third, most prior studies of online games offer evidence on the current game usage. In this present study, we went a step further to empirically test the research model to predict how motives contribute to the continuance of game playing. The resulting model is then useful in explaining the possibility to continue gamers' current experience with the game into the future.

Players' continuance intentions to play online games are of considerable interest because practitioners of online games can benefit greatly from improved understanding of the driving factors behind the continuance intentions of players. Understanding player behavior in online games is also an important research issue for practitioners in their quest to attract players to visit online game web sites more often and to develop player loyalty (Wu and Liu, 2007; Lu and Wang, 2008; Huang and Hsieh, 2011). This research is designed to test a multi-theory model for the effects of cognitive, affective and social influences on the continuance intention to play games. Although not a single theory is applicable to study all these aforementioned areas simultaneously, we were able to gain insights by focussing on the ones that cover the aspects that are lacking in the other included theories. In the present study, three key theories (SCT, flow and subjective norm from the theory of planned behavior) are included to study cognitive, affective and social influences for their relevance in these respective areas.

Social cognitive theory (SCT) has been extensively applied to explain individual behaviors (Bandura, 1977, 1986; Compeau and Higgins, 1995a, b; Compeau *et al.*, 1999; Hill and Troshani, 2010). SCT suggests that human behavior is the result of an interaction between personal cognition, the social environment and behavior (Bandura, 1977, 1986; Hmieleski and Baron, 2009). Interactions with the social environment (i.e. other game players or artificial animated figures) are a typical feature of multi-player games. Playing such games inspires one to assess personal cognition and interaction with others, which makes SCT an ideal theory to study the effect of cognition and social influence on game-playing intention. Subjective norm and its antecedents together provides the foundation to model social influence from the social environment, while the flow theory is well suited to study the affective state of optimal experience (Csikszentmihalyi, 1975, 1990). By definition, a flow experience is an affective state of highly positive emotional valence and heightened arousal (e.g. Csikszentmihalyi, 1990; Ellis *et al.*, 1994; Trevino and Webster, 1992). The flow theory supplements SCT by adding personal affective perception and thus, the resulting integrated theory becomes stronger in helping us better understand entertainment-oriented IT continuance intention through the personal cognitive and affective perspectives.

The main purpose of this research is to identify key factors that are important to continuance intention to play online games. In order to achieve this goal, we have developed a research model expanding SCT to capture the effect of affective state (flow theory) on the relationship between personal cognition (both goal-oriented vs enjoyment-oriented motives) and the continuance intention with consideration of social pressure in presence.

Literature review

SCT

SCT (Bandura, 1977, 1986) is a widely accepted theory that models individual behavior by explaining the relationships among personal cognition, environmental influences and behavioral outcome (Carillo, 2010). SCT has been widely accepted and applied in the IS literature (Chang *et al.*, 2011; Chiu *et al.*, 2006; Compeau and Higgins, 1995a, b; Hsu *et al.*, 2007; Johnson and Marakas, 2000; Lam and Lee, 2006; Lin and Huang, 2008, 2010; Looney *et al.*, 2006, 2008; Lu and Hsiao, 2007). Recent studies applied SCT to study knowledge sharing (Lin and Huang, 2008, 2010; Lu and Hsiao, 2007), virtual community (Chiu *et al.*, 2006; Hsu *et al.*, 2007), continuance intention to share information in blogs (Lu and Hsiao, 2007) and internet use among senior populations (Lam and Lee, 2006). Chang *et al.* (2011) combined the SCT and the IS success model to examine the influence of the personal cognition of users on IS satisfaction.

Utilitarian and hedonic outcome expectations

(1) *Existing classification schemes*. Outcome expectations refer to the expected consequences of one's own behavior (Bandura, 1977; Compeau and Higgins, 1995b). Individual expectations regarding the outcome of their ability to use computers are typically viewed in two forms: performance-related outcome expectations and personal outcome expectations (Compeau and Higgins, 1995a, b). Both types of outcome expectations impact computer usage. Following Chiu *et al.* (2006) and Hsu *et al.* (2007) identified two types of outcome expectations concerning knowledge sharing behavior in virtual communities: community related and personal outcome expectations. More recently, several studies (Chiu *et al.*, 2006; Hsu *et al.*, 2007; Lam and Lee, 2006; Lin and Huang, 2008; Looney *et al.*, 2006) show that these two types of outcome expectations impact individual's behavioral reactions to various IT (e.g. internet, knowledge management systems, virtual communities, online investing, etc.). In sum, literature shows that two types of expectations were possible, but the exact forms of the expectations rely heavily on the contexts. For example, the classification into performance vs personal expectations concerns most in the context where individual image and performance are relevant. The classification of personal vs community expectations is community centric, which views personal needs and the needs to balance his or her online social identity as two distinctive forms of expectations. This is a useful classification in an environment where one may care about how his or her views influence their online image and/or the overall knowledge as a whole.

(2) *Limitations of existing classifications*. In the online gaming world, the above two forms of classifications may fall short. Job performance and online image are not necessarily the key to game adoption or even the continued use intention. An individual may resort to games as a form of entertainment or a way to relieve pressure from their lives. Both motives have made job performance an irrelevant issue when in games. Additionally, an online identity in the form of avatars, nicknames and icons give an individual ample opportunity to not revealing their true identity. Since consequences from the views expressed using this virtual identity may not easily linked to their true identity, community-related outcome expectations (as studied in Chiu *et al.*, 2006; Hsu *et al.*, 2007) become a lesser concern for the gamers. Therefore, a new classification tailored for the online games is a desirable direction to model motives of gaming.

(3) *Utilitarian vs hedonic perspectives*. Previous studies have explored the hedonic and utilitarian consumptions in consumer behavior (Babin *et al.*, 1994; Holbrook and

Hirschman, 1982; Holbrook and Gardner, 1998). The same split of hedonic and utilitarian perspectives is also recommended to study gaming behavior and the nature of online games (e.g. Lin *et al.*, 2012; Storgårds *et al.*, 2009; Storgårds, 2011). Storgårds (2011) examines the hedonic and utilitarian value and their influence on product recommendation among active game players in the context of digital games. His findings suggest that games should be considered products with both entertainment and utilitarian values. This is consistent to his earlier work (i.e. Storgårds *et al.*, 2009), where the authors reported that experience and sub-categories of games were related to perceived hedonic and utilitarian perceptions. In a different study, Lin *et al.* (2012) found that individuals play physical games not only for hedonic purposes in terms of leisure and pleasure but also for utilitarian purposes in terms of exercise and health.

Outside of online games literature, research has either reported both hedonic and utilitarian perspectives within the same study (Childers *et al.*, 2001; Deng *et al.*, 2010; Premkumar *et al.*, 2008; To *et al.*, 2007) or took a special focus on one of the two. Studies on the utilitarian perspective examine whether or not benefits are acquired from usage, or whether a task is completed efficiently during usage. Hedonic studies explore the enjoyment derived from use experience, which may come from interacting with the game or with the co-created stories by the gamers (e.g. Buchanan-Oliver and Seo, 2012). Generally speaking, people with utilitarian motivation focus primarily on instrumental value, whereas people with hedonic motivation pay more attention to pleasure, fun and playfulness. One may view utilitarian factors as goal oriented and hedonic factors as enjoyment oriented.

Online game playing has both utilitarian and hedonic elements. For example, gamers may experience utilitarian motivations such as earning money, prizes or grades (Lepper *et al.*, 1973). These motivations lead to a utilitarian goal that enhances a gamer's intention to continue playing the game. Reaching the goal is part of the motivation, because it is a way to express self-identity in a group/community (Han *et al.*, 2007). On the other hand, enjoyment-oriented motivations (such as playfulness and fun) for hedonic outcome expectations can also be a source of influence that contributes to continued game playing. Thus, this study extends the concept of outcome expectations to include both utilitarian and hedonic outcome expectations in the context of online games. Utilitarian vs hedonic outcome expectations together is a more appropriate classification scheme for the gaming context compared to the other classification schemes reviewed in the previous sections. This is one of the earliest studies to divide outcome expectations into these two new constructs (utilitarian and hedonic outcome expectations) to study their interrelationships with other cognitive, affective and relational motives for game play.

Flow theory

Csikszentmihalyi (1975) defined flow as "the holistic experience that people feel when they act with total involvement," that consists of four components – control, attention, curiosity and intrinsic interest. Flow is associated with positive affect, because a strong autotelic experience might reduce the role of external rewards till the point they are perceived as redundant (Csikszentmihalyi, 1997). Flow has been studied in various contexts of information technologies such as online shopping, computer games, online games, social networking sites, e-mail and instant messages (Chang and Zhu, 2012; Chen *et al.*, 2008; Jennett *et al.*, 2008; Hausman and Siekpe, 2009; Huang and Hsieh, 2011; Hoffman and Novak, 2009; Koufaris, 2002; Mauri *et al.*, 2011; Novak *et al.*, 2000; O'Cass and Carlson, 2010; Shang *et al.*, 2005; Zaman *et al.*, 2010; Zhou and Lu, 2011).

Recently, Huang and Hsieh (2011) developed a framework based on uses and gratifications and flow theories to predict consumer's loyalty toward online gaming. They found that players' sense of control, perceived entertainment and challenge influenced their loyalty toward an online game. Conversely, sociality and interactivity produced only negligible effects on loyalty toward an online game. In addition, Chang and Zhu (2012) examined the role of flow experience in driving users to continue using social network sites based on the expectation – confirmation model of information systems continuance. They found that flow experience has influence on users' satisfaction but none on continuance intention. The flow construct has been studied as an important construct to understand online user behavior, and as a way of defining the nature of compelling online experience. In the context of online games, flow experience is considered a critical variable. Game playing may involve unique experiences for players.

Research model and hypothesis

The model proposed in this study is illustrated in Figure 1. This model includes the flow theory (Csikszentmihalyi, 1975), subjective norm and SCT (Compeau and Higgins, 1995b)
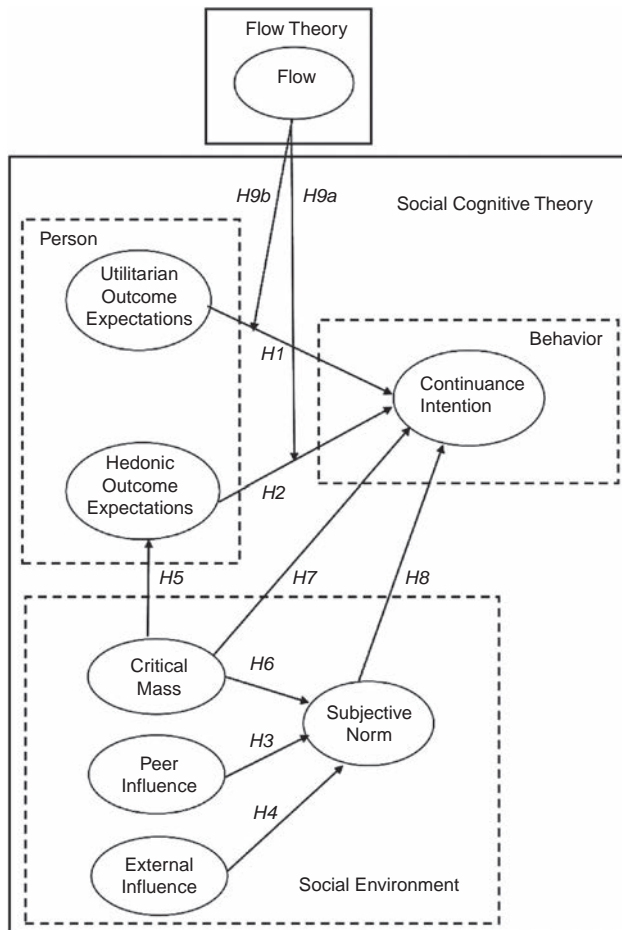

Figure 1.
Research model

with utilitarian and hedonic expectations to form a more complete prediction model for continued gaming intention. Each of these theories work well in certain contexts, but online multi-player games involves a combination of intrinsic and extrinsic factors a single theory alone is difficult to offer a more holistic view. For example, while the flow theory offers the theoretical foundation to explain an affective state of excitement when interacting with a game or peer gamers, the subjective norm construct from theory of planned behavior captures how one perceives expectations from multiple reference points. Although the two are fundamentally different concepts, both are logical drivers for a gamer to continue with a game. Thus, an integrated model can better capture the motives for continued gaming intention.

SCT

(1) Personal cognition and behavior. As reviewed in the literature section, the current trend is to view expectations of one's behavior to have two forms. However, there has not been an agreement in terms of the exact classification of expectations. The performance-based classification (Compeau and Higgins, 1995a, b) suggests that individuals expect the consequences of their own behaviors to be related to their own job performance and individual needs. The community-based classification (Chiu *et al.*, 2006; Hsu *et al.*, 2007), however, associates behavioral consequences to community and personal outcome expectations. Both are very applicable to their specialized contexts. For example, the performance-based classification is useful when the linkage between an individual's behavior and the expected performance is of most importance (e.g. in work environment). The community-based classification is applicable to an environment where the focal point is the impact of one's behavior to community. Game playing is typically for the purpose of personal enjoyment and possibly interactions with others, where job performance and contributions to a community are not necessarily top priorities. Overly focussing on these two may bias the intended focus of the study. Nevertheless, the above two classifications share a common denominator – personal outcome expectations.

Studies in consumption theories (such as Batra and Ahtola, 1991; Childers *et al.*, 2001) suggest that consumption is motivated by experiential outcomes, including hedonic and utilitarian outcomes. If playing games can be viewed as a form of "consumption," both utilitarian and hedonic expectations are possible factors that motivate continued gaming playing. For example, gamers throw in their time, energy and possibly money in exchange for a gaming experience, such as enjoyment and pleasure and/or external rewards (e.g. money, grades or prizes). In other words, the two outcome expectations from the consumption theories concern about the outcomes relating to personal goals when engaging oneself in an activity.

Utilitarian outcome expectations are related to goal-oriented outcome expectations, including expectations of gaining recognition of others, and receiving extrinsic rewards (e.g. upgrade, prize, experience point and money, etc.), whereas hedonic outcome expectations are defined as expectations associated with online game playing that may result in different forms of enjoyment (such as playfulness, fun and pleasure). Favorable experiences (i.e. utilitarian value and hedonic value) result in longer web site stay times and more frequent online usage (Hoffman and Novak, 1996; Scarpi, 2012; Wang *et al.*, 2007). Since both are drivers that motivate an individual

to perform a behavior, they are postulated to affect game-playing continuance intention below:

H1. Utilitarian outcome expectations are positively related to continuance intention to play online games.

H2. Hedonic outcome expectations are positively related to continuance intention to play online games.

(2) Social environment and behavior. Typical applications of the TPB model in the context of information technology acceptance have only examined normative influence (from peers and superiors influences) as a determinant of subjective norm (Taylor and Todd, 1995). However, if normative influence falls short, such as in the case where peers, closely related friends and relatives have no knowledge in the subject matter to make a constructive suggestion, it becomes difficult to rely only on normative influence as the single source of reference. Therefore, later studies explored two other forms of social influence (i.e. normative and informational influences; Karahanna et al., 1999; Bhattacherjee, 2000). Basing on Karahanna et al.'s (1999) work, Bhattacherjee (2000) explored both external (informational) and interpersonal (normative) influences as determinants of subjective norms. Both types of influence were strong as antecedents for subjective norms with the interpersonal influence having a slightly larger path coefficient.

Normative influence happens when an individual conforms to expectations of others (Karahanna et al., 1999). In online games, this could happen when the peers of gamers or those who the gamers trust have urged them to play the game. There are also occasions where such direct reference points were not readily available (such as new game releases, or early game adopters) or where such direct reference may be biased. Additional sources of reference may be useful. Informational influence is one such source. Therefore, this study proposes that external (information) influence and peer influence are the important reference groups that affect subjective norms in the context of online games in the following hypotheses:

H3. Peer influence is positively related to subjective norms.

H4. External influence is positively related to subjective norms.

Critical mass refers to the degree to which people believe that most of their peers are playing online games. Critical mass theory has noted that some people have "the personal characteristics of being sought after" by others (Markus, 1987). These people derive enjoyable, fun and pleasant outcome expectations from being sought after, and this produces a hedonic outcome expectation for playing online games. If people perceive that most members in their group/community are playing online games, the outcome expectations of enjoying playfulness/fun/pleasure may be higher. Thus, this study proposes that perception of critical mass influences an individual's hedonic outcome expectation.

H5. Critical mass is positively related to hedonic outcome expectations.

Subjective norm reflects the effect of significant others' opinions on an individual's behavior (Zhou, 2011). Subjective norm for the context of our study is defined as an

individual's belief as to whether other people who are important to them believe that they should play online games. The more people with whom the player plays online games, the more likely it is that those people important to the player also play online games. When these important others play online games, it provides a clear signal that they approve of playing online games. In this case, critical mass will have a positive effect on subjective norm (Slyke *et al.*, 2007). This study examines the following hypotheses:

H6. Critical mass is positively related to subjective norms.

Critical mass has not been widely studied. According to the critical mass theory (Markus, 1987) and social influence theory (Fulk, 1993), perceptions of critical mass are believed to have a direct influence on technology acceptance. A large number of users of a given system may be an indication of the system being important, useful or fun, which ultimately influence others' acceptance of the system (Li *et al.*, 2005; Lou *et al.*, 2000; Slyke *et al.*, 2007). Social influence, a concept related to critical mass, has been shown to have a direct influence on behavioral intention (Venkatesh and Morris, 2000; Venkatesh *et al.*, 2000). When there are a substantial number of people playing a game, it gives a message that there might be something about the game that is worth playing or opportunities with existing gamers that are worth of pursuing. Therefore, critical mass of gamers is an incentive for continued game play:

H7. Critical mass is positively related to continuance intention to play online games.

Social influence impacts users' perception and behavior (Lu and Wang, 2008). Based on TRA and TPB, subjective norms directly determine behavioral intention (Ajzen, 1991; Fishbein and Ajzen, 1975). Fishbein and Ajzen (1975) defined subjective norms as perceptions of the preferences of significant others regarding the worth of engaging in a specific behavior. In addition, Ajzen (1991) noted that a subjective norm refers to individual perceptions of social pressure regarding whether or not to perform a particular behavior. Subjective norm has received considerable empirical support as an important antecedent to behavioral intention (Mathieson, 1991; Taylor and Todd, 1995; Thompson *et al.*, 1991). The higher the subjective norm is, the higher the continuance intention will be.

H8. Subjective norms are positively related to continuance intention to play online games.

(3) Flow and behavior. Many studies have empirically tested the flow theory and their direct consequences (Novak *et al.*, 2000). Literature supports that flow is related to exploratory behavior and positive subjective experience (Novak *et al.*, 2000; Webster *et al.*, 1993). When in the flow state, players become absorbed in their activity, and the focus of awareness is narrowed down to the activity itself, while irrelevant perceptions and thoughts are filtered out (Csikszentmihalyi, 1975). Recently, flow theory has been applied in various IT and relative services because it describes mental phenomena well (Ha *et al.*, 2007). In the context of online games, players with a high level of flow may be more willing to engage themselves in online games because they are attracted to the potential for an experience that is both engulfing and enjoyable. Two forms of such expectations are of interest to this study: expectations of greater utilitarian

outcomes (better image, status and rewards) and hedonic outcomes (pleasure, fun and playfulness).

Gupta and Kabadayi (2010) suggested that the level of flow experience can influence the trusting belief-loyalty relationship. Moreover, Sicilia *et al.* (2004) found the intensity of flow experience can influence the relationship between consumer information processing and web site effectiveness. As the above cited studies show, the levels of belief, perception or even motivational factors on an outcome variable (such as loyalty, effectiveness and intention) may be influenced by the flow experience for those activities where flow can have an effect. Other evidence of flow having a direct, indirect or moderating effect are found in several other studies, such as (Agarwal and Karahanna, 2000; Wakefield and Whitten, 2006).

As with any form of expectations, external stimuli could change the nature of the expectations or the effect coming out of them. In the context of online games, the effect of one's expectations (both utilitarian and hedonic) toward continuing with the game could be confirmed or weakened with one's actual engaging experience with the game (or more specifically the existence of a "flow" state). A high level of flow experience is similar to a strong incentive for one to actualize expectations into intentions. For example, Schlosser (2003) found that consumers with an experiential motive focussed on the enjoyment from their web navigation experience. Senecal *et al.* (2002) found that flow affects consumers' online shopping experiences, mainly through hedonic value. Gupta and Kabadayi (2010) also confirmed flow as a moderator for consumers with an experiential motive. Similar to this type of experiential motive in which enjoyment is derived from the process rather than the end result, gamers with hedonic outcome expectations in the present study may be more interested in the process of playing the game where a high level of flow state is likely the actualization of a hedonic expectation. Therefore, flow is expected to moderate the effect of hedonic expectations on continuance intention.

H9a. Flow positively moderates the relationship between hedonic outcome expectations and continuance intention to play online games.

Koufaris (2002) pointed out that flow might provide utilitarian value to consumers whose motivation is goal oriented. Gupta and Kabadayi (2010) contend that goal-oriented motives are directed to achieve some specific outcome, rather than to experience the process of doing it. As a result, flow or not is not a main concern when evaluating the outcome from the goal-oriented lenses. On the other hand, Sicilia *et al.* (2004) report that individuals in flow state are likely to process information more thoroughly and carefully, thus supporting flow as a moderator for the relationship between information process and web site effectiveness. This suggests that flow could lead to a more efficient way to achieving utilitarian results. Users with high cognitive absorption may believe positive relationship between technology usefulness and may be more willing to engage in new technologies (Wakefield and Whitten, 2006). In our present study, utilitarian outcomes include competency in gaming, sense of accomplishment, respected higher status and winning rewards, which all require one to be fully involved, concentrated and immersed in order to master the game. These are typical attributes for one to be involved in a flow state. Therefore, flow is postulated to have a positive moderating effect on the relationship between utilitarian outcome expectations and continued play intention:

H9b. Flow positively moderates the relationship between utilitarian outcome expectations and continuance intention to play online games.

Research methodology

Measurement

The questionnaire was designed based on existing studies in the literature (see Appendix). A pre-test of the survey was carried out by three researchers in the field to improve the face validity of the instrument. A total of 46 graduate students participated in the pilot study before the instrument was fully launched to the target population. The Cronbach's α of each construct exceeds the generally accepted cut-off point of 0.70 (Nunnally, 1987). All items in the questionnaires were measured in a seven-point Likert scale, with 1 representing total disagreement and 7 representing total agreement.

One popular focus of the utilitarian dimension is the utilitarian experience, which includes experience-based constructs, such as usefulness of the product (e.g. Voss *et al.*, 2003) or perceptions on general functions of a product (e.g. Babin *et al.*, 1994) or one's mastery of using a product (e.g. Childers *et al.*, 2001). While of great value, this type of experience does not capture one's expectation in seeking personal gains or extrinsic rewards (such as competence, accomplishment, rewards, higher status and opportunity to upgrade) that are frequently reported in game studies (e.g. Wan and Chiou, 2007). This is the type of utilitarian expectations called "expectations of change in image or status or expectations of rewards" (Compeau *et al.*, 1999, pp. 147-148). Therefore, items for utilitarian outcome expectations were adapted from Lin and Huang (2008) for their closer approximation of assessing the aforementioned types of extrinsic rewards. These items were modified to fit the context of online games.

Furthermore, the items measuring hedonic outcome expectations and flow were adapted from Davis *et al.* (1992) and Novak *et al.* (2000). The questions for subjective norms and peer influence were adapted from Mathieson (1991) and Taylor and Todd (1995), with modifications to suit the context of online games. The items for critical mass and external influence were adapted from Lou *et al.* (2000) and Bhattacherjee (2000). Questions for continuance intention were developed from Agarwal and Karahanna (2000). All of these items were modified to fit the context of online games.

Data collection

Empirical data were collected for those with experience playing online multi-player games that involves social interaction. Announcements were made on several popular game-related web sites, including Bahamut (www.gamer.com.tw), Gamebase (www.gamebase.com.tw), Gamemad (www.gamemad.com) and game-related boards in Taiwan (including Yahoo!, Kimo, PChome Online and Yam) to invite online game players to fill out the questionnaire. In total, 20 cash prizes of NT$600, approximately US$20, were awarded at the completion of the survey. A lottery was held for the event as an incentive.

A total of 208 questionnaires were received. After eliminating the duplicated copies, copies with missing values or other invalid copies, a total of 166 questionnaires were regarded as valid. The demographic distribution of the sample is present in Table I. Of all the respondents, 56.0 percent were male and 44.0 percent were female. Around half of the respondents (57.8 percent) were under age 20. Young people were the largest groups to play online games in the present study, which is also consistent with the findings in the literature (e.g. Qin *et al.*, 2009). In all, 75.9 percent of respondents played online games from home. Most of the respondents (74.4 percent) used ADSL as their main means of accessing online games. In total, 41.0 percent of total respondents played role-playing games frequently.

Demographics	Category	Frequency	%
Gender	Male	93	56.0
	Female	73	44.0
Age	<19	96	57.8
	20-29	65	39.1
	30-39	3	1.8
	>40	2	1.2
Type of playing online game	Action	31	18.7
	Adventure	16	9.6
	Role-playing game	68	41.0
	Simulation	4	2.4
	Sports	5	3.0
	Strategy	3	1.8
	Classic/puzzle	29	17.5
	War-games	7	4.2
	Others	3	1.8
Place of playing online game	Home	126	75.9
	Campus	25	15.1
	Net cafe	12	7.2
	Others	3	1.8
Internet connectivity	ADSL	124	74.7
	Dial-up	3	1.8
	Cable modem	8	4.8
	LAN	20	12.1
	Leased line	4	2.4
	Wireless	5	3.0
	Others	2	1.2
Playing online game experiences	<1	25	15.1
(Year)	1-2	17	10.2
	2-3	23	13.9
	3-4	20	12.0
	4-5	20	12.0
	5-6	10	6.0
	>6	51	30.7

Table I.
Descriptive statistics
of respondents

Sample size adequacy is measured in two ways. First, a common rule of thumb frequently suggested in previous studies (such as Chin and Newsted, 1999) is followed first. For example, Chin *et al.* (1996) established a guideline suggesting that "(1) ten times the scale with the largest number of formative (i.e. causal) indicators (note that scales for constructs designated with reflective indicators can be ignored), or (2) ten times the largest number of structural paths directed at a particular construct in the structural model" (p. 39). The second rule applies to our work since our latent variables all include reflective indicators. The largest number of structural paths in our structural model is four for the continuance intention construct. This translates to 40 (4×10) as the minimum sample size requirement.

Westland (2010) offers a theoretical foundation to calculate the lower bound of sample size in his algorithm:

$$n \geqslant 50r^2 - 450r + 1,100$$

n is the computed sample size lower bound, $r = p/k$, p the number of parameters (indicators) in the SEM, k the number of latent variables in the SEM.

In the present study, r is calculated as $27/8 = 3.375$. Based on this above formula, the lower bound of the sample size is $50 \times (3.375)^2 - 450 \times 3.375 + 1{,}100 = 151$. Our final sample size of 166 meets this minimum requirement.

We conducted the Harman's one-factor test to assess the severity of common method bias (Harman, 1967). The result of principal components factor analysis shows eight factors each with an eigenvalue greater than one. There is no single factor that accounts for the majority of the variance. In fact, the largest variance explained by one factor is only 24.57 percent, indicating that common method bias is not an alarming concern.

Data analysis and results

Measurement model

The measurement model was assessed for its reliability of individual items, internal consistency between items as well as the model's convergent and discriminant validity. Skewness of distributions ranges from -0.80 to 0.23, and kurtosis ranges from -0.59 to 0.60. Both are within the acceptable range of normality (skewness <2, and kurtosis <5) established by Ghiselli *et al.* (1981). Table II shows the number of items, mean and standard deviation, Cronbach's α, composite reliability and average variance extracted (AVE), as well as the square root of the AVE.

As the table shows, both the Cronbach's α and the composite reliability measures were all greater than the acceptable cut-off point of 0.700 recommended by previous works, indicating an adequate level of internal consistency (Bagozzi and Yi, 2012). Convergent validity is demonstrated in that the AVE values for all constructs were above the suggested threshold value of 0.500 (Fornell and Larcker, 1981). Table III shows the correlations between the constructs. Diagonal values represent the square root of the AVE, while the other matrix entries represent the correlations. Discriminant validity is shown when the square root of each construct's AVE is larger than its correlations with other constructs (Fornell and Larcker, 1981). The square root of AVE for each construct is much larger than its correlations with the other constructs; therefore an acceptable level of discriminant validity was achieved (see Table III).

Competing models

Three competing models are conducted and reported in this section. The first model is the baseline model with the absence of the flow construct. Figure 2 shows that the baseline model explains 68 percent of the variance for the continuance intention variable. The second model is the direct effect model that the flow construct is studied

No.	Construct	No. of items	Mean (SD)	Cronbach's α	Composite reliability	AVE
1	Utilitarian outcome expectations (UOE)	5	4.22 (1.29)	0.92	0.935	0.790
2	Hedonic outcome expectations (HOE)	3	5.98 (1.44)	0.95	0.982	0.952
3	Subjective norm (SN)	3	5.07 (1.25)	0.93	0.949	0.880
4	Critical mass (CM)	3	4.73 (1.39)	0.94	0.959	0.886
5	Peer influence (PI)	4	5.33 (1.05)	0.88	0.926	0.760
6	External influence (EI)	3	4.39 (1.33)	0.94	0.968	0.911
7	Flow (FL)	3	4.71 (1.43)	0.93	0.957	0.881
8	Continuance intention (CI)	3	4.43 (1.58)	0.95	0.979	0.938

Table II.
Reliability and validity

	UOE	HOE	SN	CM	PI	EI	FL	BI
UOE	0.861							
HOE	0.589	0.974						
SN	0.491	0.671	0.928					
CM	0.592	0.549	0.553	0.941				
PI	0.384	0.533	0.653	0.411	0.830			
EI	0.421	0.518	0.469	0.494	0.586	0.954		
FL	0.320	0.337	0.477	0.262	0.343	0.314	0.939	
BI	0.550	0.687	0.648	0.583	0.485	0.525	0.462	0.969

Note: Diagonals represent the square root of the average variance extracted, while the other matrix entries represent the correlations

Table III.
Correlations between constructs
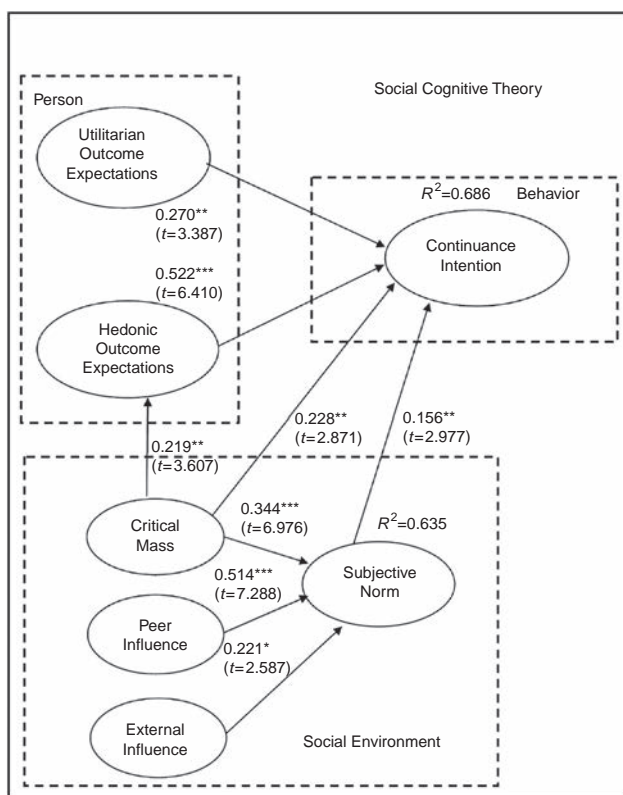
Notes: ***$p<0.001$; **$p<0.01$; *$p<0.05$

Figure 2.
Baseline model (without flow)

to have a direct effect on continuance intention. The result in Figure 3 shows that the proportion of variance explained in this model is slightly improved from 68 to 70.2 percent. The third model is a moderation model where the flow construct is studied to moderate the relationships between the two expectation outcome variables (utilitarian and hedonic) and the dependent variable. As shown in Figure 4, this model explains even a larger proportion of variance (79.80 percent) than the previous two models.
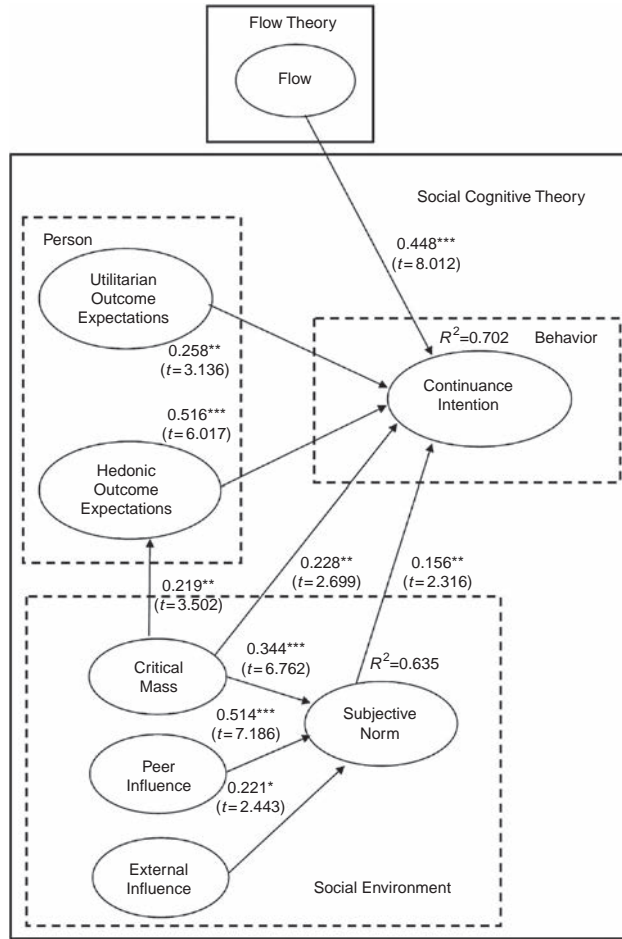
Figure 3.
Competing model
(flow as a direct effect)

Notes: ***$p<0.001$; **$p<0.01$; *$p<0.05$

We also compared the effect size of the three competing models by following a hierarchical process similar to multiple regressions (Chin *et al.*, 1996). The differences in R^2 among the baseline, direct effect and moderation model were used to assess the overall effect size f^2 for the interaction where 0.02, 0.15 and 0.35 have been suggested to be small, moderate and large effects, respectively (Cohen, 1988).

The calculation of effect size (f^2) was proposed by Chin (1998) as follows:

$$f^2 = \frac{R^2_{\text{included}} - R^2_{\text{excluded}}}{1 - R^2_{\text{included}}} \tag{1}$$

where f^2 is the overall effect size for the interaction, R^2_{included} is the R^2 value of a dependent construct when the examined independent construct is included in the model, and R^2_{excluded} is the R^2 value of a dependent construct when the examined independent construct is excluded from the model.
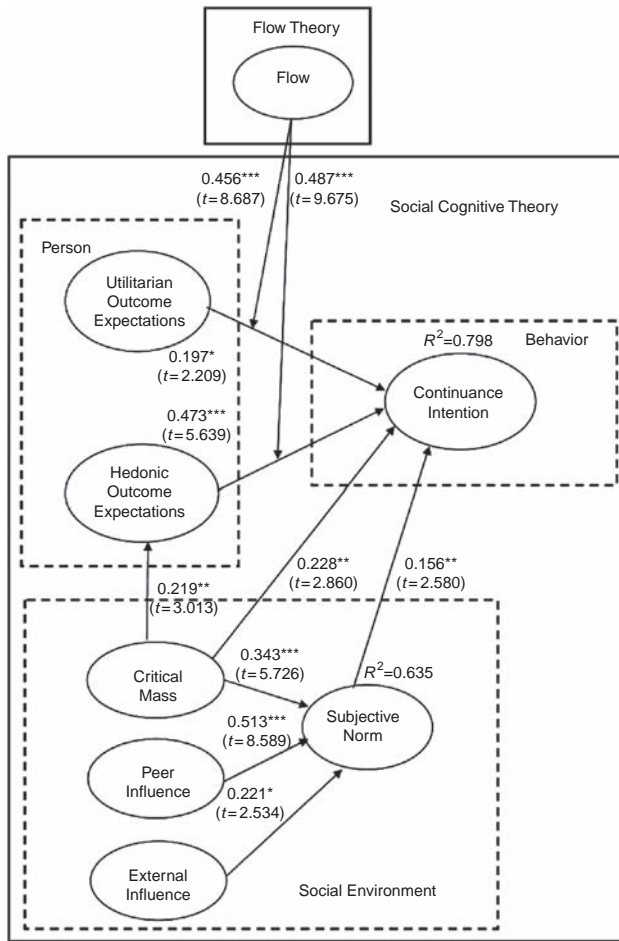
Notes: ***$p<0.001$; **$p<0.01$; *$p<0.05$

Figure 4.
Moderation model
(flow as a moderator)

Based on the hierarchical difference test (see Table IV), the moderating effect was found to have an effect size f^2 of 0.475 which represents a large effect. The moderation model in which flow is proposed to moderate the links between continuance intention and its antecedents possesses significantly higher explanatory power than the other two models. Therefore, the moderation model is chosen as our final model.

	R^2	f-statistics	f-statistics
Baseline model (without flow)	0.686		0.554
Interaction effect model (flow as a moderator)	0.798	0.475	
Competing model (flow as a direct effect)	0.702		

Note: f-statistics tests the results of two models (i.e. one with and one without the interaction construct
Source: Chin *et al.* (1996)

Table IV.
Hierarchical
difference test

Hypothesis testing
The standardized PLS path coefficients for the moderation model are shown in Figure 4. The findings supported all hypotheses (*H1-H9*), including the two hypotheses *H9a* and *H9b* for the moderation effect. In terms of personal cognition and behavior, the research model shows that continuance intention is predicted by utilitarian outcome expectations ($\beta = 0.197$, *t*-value = 2.209), and hedonic outcome expectations ($\beta = 0.473$, *t*-value = 5.639). Thus, *H1* and *H2* are both supported. The larger path coefficient for the hedonic outcome expectations indicates that this construct has a greater effect on continuance intention than utilitarian outcome expectations. In terms of social environment and behavior, subjective norms are predicted by peer influence ($\beta = 0.513$, *t*-value = 8.589) and external influence ($\beta = 0.221$, *t*-value = 2.534). Hence, *H3* and *H4* are both supported. Results also support the prediction that critical mass positively influences hedonic outcome expectations ($\beta = 0.219$, *t*-value = 3.013), and subjective norms ($\beta = 0.343$, *t*-value = 5.726). *H5* and *H6* are both supported. It should be noted that peer influence has a greater influence on subjective norm than do external influence and critical mass. In addition, continuance intention is predicted by critical mass ($\beta = 0.228$, *t*-value = 2.860) and subjective norms ($\beta = 0.156$, *t*-value = 2.580). Hence, *H7* and *H8* are both supported. In terms of flow experience and behavior, flow positively moderated the relationship between utilitarian outcome expectations and continuance intention to play online games ($\beta = 0.456$, *t*-value = 8.687). Moreover, flow positively moderated the relationship between hedonic outcome expectations and continuance intention to play online games ($\beta = 0.487$, *t*-value = 9.675). Thus *H9a* and *H9b* are both supported. These constructs explained 79.8 percent of the variance of continuance intention. The explained variance of subjective norms was above 63.5 percent. The measure of the variance explanation shows that the model has sufficient explanatory power and therefore may be used to predict continuance intention and actual behavior.

Discussion
Some theoretical and practical contributions are possible from this research. This study contributes to an improved understanding of the critical factors that promote entertainment-oriented technology, such as those in online games. First, many previous studies explored IS adoption such as acceptance (i.e. Technology Acceptance Model (TAM)) (Koufaris, 2002; Lee, 2009; Lu *et al.*, 2003; Venkatesh and Bala, 2008), satisfaction (Au *et al.*, 2008; Castañeda *et al.*, 2007; Choi *et al.*, 2008; Deng *et al.*, 2010) and quality (Ahn *et al.*, 2007; Cheong and Park, 2005; Nelson *et al.*, 2005). However, there is little empirical evidence on factors influencing continuance intention of online games (Hsiao and Chiou, 2012a, b). The present research model explored continuance intention of players in the context of online games that is different from most past research. Second, cognition (SCT and two expectations) and affect (flow experience) are taken together to study their combined effects on continued gaming intention. Unilateral reliance on either one, which seems to be a popular approach in a number of research studies on games, may bias our understanding of the true effect of predictors and their outcomes. The trend to consider both cognitive and affective factors in human-computer interaction has received a recent attention, but a much needed approach that integrates the two types of factors is still lacking. Therefore, this study is designed to serve this purpose. Third, the significant moderating effects of flow provide important implications in the theoretical sense. Expectations (be it utilitarian or hedonic) characterize the pre-use experience, which may be unreliable and could be

influenced by several means (such as by advertisements and hearsay). It may not be the final form of user experience until a gamer actually "experiences" the game. However, not any use experience can have a lasting effect. This is the reason we focussed on flow, which is presumably an experience of engagement, involvement and immersing oneself in the game. Our work adds to the understanding that the effects of both goal-oriented and enjoyment-oriented expectations vary as the flow experience changes. By introducing flow as the moderator, we are able to see how pre-existing expectations are shaped by gamers' own flow experience. The resulting moderation model explains 79.80 percent of the variance in continuance intention – an improvement over the baseline and direct effect models, which explain 68 and 70.2 percent of variance, respectively. The moderation model also has the larger effect size than the other two. By integrating SCT with flow, we are able to provide a richer explanation of online game continuance intention than using SCT alone.

Fourth, our work offers additional evidence of the debate for the role of flow in utilitarian expectations. As explained before, there was an ongoing debate of flow on utilitarian motives. Our work supports the school of thought that flow inspires one to work toward a goal more diligently, thus making it easier to meet his or her utilitarian goals of being more reputable and earning a higher status.

Fifth, the inclusion of utilitarian and hedonic outcome expectations in our integrated model introduces two new constructs and a new set of relationships with existing constructs, which also leads to theoretical contributions to the literature. Although seldom studied in online games, the two constructs on expectations allow us to see simultaneously how the two primary motives (enjoyment and goal oriented) are related to continuance intention. This classification is more relevant to online games compared to performance-based classification (Compeau and Higgins, 1995a, b) and community-based classification (Chiu *et al.*, 2006; Hsu *et al.*, 2007) that are popular in the literature. Sixth, although a direct comparison of our model with other studies is difficult due to differences in model structure and construct relationships, a review of the amount of variance explained for the dependent variable may reveal some insights. Our integrated model explains a larger amount of variance (79.8 percent) for the continuance intention than existing online games or SCT models. For example, Lu and Hsiao (2007) reported 24.3 percent of explained variance for their SCT model, Lin and Huang (2008) reported 49.7 percent, Compeau *et al.* (1999) reported 34.3 percent, Kim *et al.* (2005) reported 51.7 percent and Huang and Hsieh (2011) reported 55.0 percent. This significant improvement of our model compared to other works provides some evidence of applicability to integrate the theories examined in the present study.

Managerial implications

According to our findings, players are likely to play online games when positive hedonic outcome expectations can be realized, but the novelty wants when one has successfully completed many stages of a game. With the utilitarian motivations (better reputation, higher status and earned virtual value), gamers have another reason to continue playing the game. Improving interactivity and multimedia enjoyment have always been a key element of game design, but our findings suggest that building utilitarian reasons is equally important. One way to do this is to foster recognition among social groups within the game by sharing not just the resulting scores with one's own community, but the process of overcoming difficult scenarios within each level/stage of the game. This offers plenty of opportunities for game developers and marketers. For game developers, games can be designed to promote a complete

assessment of competing gaming strategies (including strategy planning, formation, execution and evaluation), which makes games fun not just for aesthetic and interactive reasons, but also for reasons to learn to sharpen one's decision skills. Marketers will be able to promote the game beyond the user interface capabilities – an added competitive advantage that offers a "blue ocean" type of innovation.

To keep a player in a flow state, this study suggests that online game designers should consider a balance of challenge, skills and social needs of gamers. Traditionally moderate challenge that matches one's skills was the focal point of game design, but social needs are becoming another force that engages gamers. With social needs added to the pool, a gamer will not necessarily abandon a game just because it is too hard for his or her level of skills. Therefore, game designers are recommended to explore social features that create a "sticky effect" for gamers to stay with the game longer or attract new gamers to the game.

Furthermore, online game marketers need to rethink how to tap into the positive experiences of existing game groups within their games as a means of driving future acceptance rather than relying solely on mass media (Hsiao and Chiou, 2012b). Game marketers can enhance peer influence through various channels. For example, interactive communication (e.g. chat room, instant messaging and really simple syndication) within the game and across social networking web sites (such as Facebook and Twitter) may be implemented to foster a sense of community and reach out for potential players. External influence is the least influential predictor for subjective norm in our study, but participation of game designers or user champions in online forums, media outlets and prize competitions can be utilized as ways to foster credible and authoritative messages. Similar to book-signing events when a new book comes out, marketing professionals may be able to invite game developers to share design aspects, behind-the-scene activities, strategies and the like on the internet to engage interests in the game. If the competing strategy concept in the preceding paragraph is implemented, the rationale and the different forms of strategies may be explored at these events. As a result, the game itself is no longer an entertainment object, but something that allows for decision-making, learning, simulation and sharping of the mind.

References

Agarwal, R. and Karahanna, E. (2000), "Time flies when you're having fun: cognitive absorption and beliefs about information technology usage", *MIS Quarterly*, Vol. 24 No. 4, pp. 665-694.

Ahn, T., Ryu, S. and Han, I. (2007), "The impact of web quality and playfulness on user acceptance of online retailing", *Information & Management*, Vol. 44 No. 3, pp. 263-275.

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Au, N., Ngai, E.W.T. and Cheng, T.C.E. (2008), "Extending the understanding of end user information systems satisfaction formation: an equitable needs fulfillment model approach", *MIS Quarterly*, Vol. 32 No. 1, pp. 43-66.

Babin, B.J., Darden, W.R. and Griffin, M. (1994), "Work and/or fun: measuring hedonic and utilitarian shopping value", *Journal of Consumer Research*, Vol. 20 No. 4, pp. 644-656.

Bagozzi, R. and Yi, Y. (2012), "Specification, evaluation, and interpretation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 40 No. 1, pp. 8-34.

Bandura, A. (1977), "Self-efficacy: toward a unifying theory of behavioral change", *Psychological Review*, Vol. 84 No. 2, pp. 191-215.

Bandura, A. (1986), *Social Foundations of Thought and Action*, Prentice-Hall, Englewood Cliffs, NJ.

Batra, R. and Ahtola, O. (1991), "Measuring the hedonic and utilitarian sources of consumer attitudes", *Marketing Letters*, Vol. 2 No. 2, pp. 159-170.

Bhattacherjee, A. (2000), "Acceptance of e-commerce services: the case of electronic brokerages", *IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans*, Vol. 30 No. 4, pp. 411-420.

Buchanan-Oliver, M. and Seo, Y. (2012), "Play as co-created narrative in computer game consumption: the hero's journey in Warcraft III", *Journal of Consumer Behaviour*, Vol. 11 No. 6, pp. 423-431.

Carillo, K.D. (2010), "Social cognitive theory in is research – literature review, criticism, and research agenda", *Communications in Computer and Information Science*, Vol. 54 No. 2, pp. 20-31.

Castañeda, J.A., Frías, D.M. and Rodríguez, M.A. (2007), "The influence of the internet on destination satisfaction", *Internet Research*, Vol. 17 No. 4, pp. 402-420.

Chang, L.M., Chang, S.I., Ho, C.T., Yen, D.C. and Chiang, M.C. (2011), "Effects of IS characteristics on e-business success factors of small- and medium-sized enterprises", *Computers in Human Behavior*, Vol. 27 No. 6, pp. 2129-2140.

Chang, Y.P. and Zhu, D.H. (2012), "The role of perceived social capital and flow experience in building users' continuance intention to social networking sites in China", *Computers in Human Behavior*, Vol. 28 No. 3, pp. 995-1001.

Chen, K.C., David Yen, C., Hung, S.Y. and Albert Huang, H. (2008), "An exploratory study on the selection of communication media: the relationship between flow and communication outcomes", *Decision Support Systems*, Vol. 45 No. 4, pp. 822-832.

Cheong, J.H. and Park, M. (2005), "Mobile internet acceptance in Korea", *Internet Research*, Vol. 15 No. 2, pp. 125-140.

Childers, T.L., Carr, C.L., Peck, J. and Carson, S. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior", *Journal of Retailing*, Vol. 77 No. 4, pp. 511-535.

Chin, W.W. (1998), "The partial least squares approach for structural equation modeling", in Marcoulides, G.A. (Ed.), *Modern Methods for Business Research*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 295-336.

Chin, W.W. and Newsted, P.R. (1999), "Structural equation modeling analysis with small samples using partial least squares", in Hoyle, R.H. (Ed.), *Statistical Strategies for Small Sample Research*, Sage, Thousand Oaks, CA, pp. 307-341.

Chin, W.W., Marcolin, B.L. and Newsted, P.R. (1996), "A partial least squares latent variable modeling approach for measuring interaction effects: results from a Monte Carlo simulation study and voice mail emotion/adoption study", in DeGross, J.I., Jarvenpaa, S. and Srinivasan, A. (Eds), *Proceedings of the Seventeenth International Conference on Information Systems, Association for Information Systems, Cleveland, OH*, pp. 21-41.

Chiu, C.M., Hsu, M.H. and Wang, E.T.G. (2006), "Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories", *Decision Support Systems*, Vol. 42 No. 3, pp. 1872-1888.

Choi, J., Seol, H., Lee, S., Cho, H. and Park, Y. (2008), "Customer satisfaction factors of mobile commerce in Korea", *Internet Research*, Vol. 18 No. 3, pp. 313-335.

Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed., Lawrence Erlbaum Associates, Hillsdale, NJ.

Compeau, D.R. and Higgins, C.A. (1995a), "Application of social cognitive theory to training for computer skills", *Information Systems Research*, Vol. 6 No. 2, pp. 118-143.

Compeau, D.R. and Higgins, C.A. (1995b), "Computer self-efficacy: development of a measure initial test", *MIS Quarterly*, Vol. 9 No. 2, pp. 189-211.

Compeau, D.R., Higgins, C.A. and Huff, S. (1999), "Social cognitive theory and individual reactions to computing technology: a longitudinal study", *MIS Quarterly*, Vol. 23 No. 2, pp. 145-158.

Csikszentmihalyi, M. (1975), *Beyond Boredom and Anxiety*, Jossey Bass, San Francisco, CA.

Csikszentmihalyi, M. (1990), *Flow: The Psychology of Optimal Experience*, Harper Perennial, New York, NY.

Csikszentmihalyi, M. (1997), *Creativity: Flow and the Psychology of Discovery and Invention*, Harper Perennial, New York, NY.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1992), "Extrinsic and intrinsic motivation to use computers in the workplace", *Journal of Applied Social Psychology*, Vol. 22 No. 14, pp. 1111-1132.

Deng, L., Turner, D.E., Gehling, R. and Prince, B. (2010), "User experience, satisfaction, and continual usage intention of IT", *European Journal of Information Systems*, Vol. 19 No. 1, pp. 60-75.

Ellis, G.D., Voelkl, J.E. and Morris, C. (1994), "Measurement and analysis issues with explanation of variance in daily experience using the flow model", *Journal of Leisure Research*, Vol. 26 No. 4, pp. 337-356.

Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intentions and Behavior: An Introduction to Theory and Research Reading*, Addison-Wesley, Boston, MA.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Fulk, J. (1993), "Social construction of communication technology", *Academy of Management Journal*, Vol. 36 No. 5, pp. 921-950.

Ghiselli, E.E., Campbell, J.P. and Zedeck, J.P. (1981), *Measurement Theory for the Behavioral Sciences*, Freeman, San Francisco, CA.

Gupta, R. and Kabadayi, S. (2010), "The relationship between trusting beliefs and web site loyalty: the moderating role of consumer motives and flow", *Psychology & Marketing*, Vol. 27 No. 2, pp. 166-185.

Ha, I., Yoon, Y. and Choi, M. (2007), "Determinants of adoption of mobile games under mobile broadband wireless access environment", *Information & Management*, Vol. 44 No. 3, pp. 276-286.

Han, J.J., Zheng, R.J. and Xu, Y. (2007), "The effect of individual needs, trust and identification in explaining participation intentions in virtual communities", *Proceedings of the 40th Hawaii International Conference on System Sciences*, Big Island, January 3-6.

Harman, H.H. (1967), *Modern Factor Analysis*, University of Chicago Press, Chicago, IL.

Hausman, A.V. and Siekpe, J.S. (2009), "The effect of web interface features on consumer online purchase intentions", *Journal of Business Research*, Vol. 62 No. 1, pp. 5-13.

Hill, S.R. and Troshani, I. (2010), "Factors influencing the adoption of personalisation mobile services: empirical evidence from young Australians", *International Journal of Mobile Communications*, Vol. 8 No. 2, pp. 150-168.

Hmieleski, K.M. and Baron, R.A. (2009), "Entrepreneurs' optimism and new venture performance: a social cognitive perspective", *Academy of Management Journal*, Vol. 52 No. 3, pp. 473-488.

Hoffman, D.L. and Novak, T.P. (1996), "Marketing in hypermedia computer-mediated environments: conceptual foundations", *Journal of Marketing*, Vol. 60 No. 3, pp. 50-68.

Hoffman, D.L. and Novak, T.P. (2009), "Flow online: lessons learned and future prospects", *Journal of Interactive Marketing*, Vol. 23 No. 1, pp. 23-34.

Holbrook, M.B. and Gardner, M.P. (1998), "How motivation moderates the effects of emotions on the duration of consumption", *Journal of Business Research*, Vol. 42 No. 3, pp. 241-252.

Holbrook, M.B. and Hirschman, E.C. (1982), "The experiential aspects of consumption: consumer fantasies, feelings, and fun", *Journal of Consumer Research*, Vol. 9 No. 2, pp. 132-140.

Hsiao, C.C. and Chiou, J.S. (2012a), "The effects of a player's network centrality on resource accessibility, game enjoyment, and continuance intention: a study on online gaming communities", *Electronic Commerce Research and Applications*, Vol. 11 No. 1, pp. 75-84.

Hsiao, C.C. and Chiou, J.S. (2012b), "The impact of online community position on online game continuance intention: do game knowledge and community size matter?", *Information & Management*, Vol. 49 No. 6, pp. 292-300.

Hsu, M.H., Ju, T.L., Yen, C.H. and Chang., C.H. (2007), "Knowledge sharing behavior in virtual communities: the relationship between trust, self-efficacy, and outcome expectations", *International Journal of Human-Computer Studies*, Vol. 65 No. 2, pp. 153-169.

Huang, L.Y. and Hsieh, Y.J. (2011), "Predicting online game loyalty based on need gratification and experiential motives", *Internet Research*, Vol. 21 No. 5, pp. 581-598.

Jennett, C., Cox, A.L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T. and Walton, A. (2008), "Measuring and defining the experience of immersion in games", *International Journal of Human-Computer Studies*, Vol. 66 No. 9, pp. 641-661.

Johnson, R.D. and Marakas, G.M. (2000), "Research report: the role of behavioral modeling in computer skills acquisition: toward refinement of the model", *Information Systems Research*, Vol. 11 No. 4, pp. 402-417.

Karahanna, E., Straub, D.W. and Chervany, N.L. (1999), "Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs", *MIS Quarterly*, Vol. 23 No. 2, pp. 183-204.

Kim, Y., Oh, S. and Lee, H. (2005), "What makes people experience flow? Social characteristics of online games", *International Journal of Advanced Media & Communication*, Vol. 1 No. 1, pp. 76-92.

Koufaris, M. (2002), "Applying the technology acceptance model and flow theory to on-line consumer behavior", *Information System Research*, Vol. 13 No. 2, pp. 205-223.

Lam, J.C.Y. and Lee, M.K.O. (2006), "Digital inclusiveness – longitudinal study of internet adoption by older adults", *Journal of Management Information Systems*, Vol. 22 No. 4, pp. 177-206.

Lee, M. (2009), "Factors influencing the adoption of internet banking: an integration of TAM and TPB with perceived risk and perceived benefit", *Electronic Commerce Research and Applications*, Vol. 8 No. 3, pp. 130-141.

Lepper, M.R., Greene, D. and Nisbett, R.E. (1973), "Undermining children's intrinsic interest with extrinsic rewards: a test of the 'over justification' hypothesis", *Journal of Personality and Social Psychology*, Vol. 28 No. 1, pp. 129-137.

Li, D., Chau, P.Y.K. and Lou, H. (2005), "Understanding individual adoption of instant messaging: an empirical investigation", *Journal of Association for Information Systems*, Vol. 6 No. 4, pp. 102-129.

Lin, H.H., Wang, Y.S. and Chou, C.H. (2012), "Hedonic and utilitarian motivations for physical game systems use behavior", *International Journal of Human-Computer Interaction*, Vol. 28 No. 7, pp. 445-455.

Lin, T.C. and Huang, C.C. (2008), "Understanding knowledge management system usage antecedents: an integration of social cognitive theory and task technology fit", *Information & Management*, Vol. 45 No. 6, pp. 410-417.

Lin, T.C. and Huang, C.C. (2010), "Withholding effort in knowledge contribution: the role of social exchange and social cognitive on project teams", *Information & Management*, Vol. 47 No. 3, pp. 188-196.

Looney, C., Valacich, J., Todd, P. and Morris, M. (2006), "Paradoxes of online investing: testing the influence of technology on user expectancies", *Decision Science*, Vol. 37 No. 2, pp. 205-246.

Looney, C.A., Akbulut, A.Y. and Poston, R.S. (2008), "Understanding the determinants of service channel preference in the early stages of adoption: a social cognitive perspective on online brokerage services", *Decision Sciences*, Vol. 39 No. 4, pp. 821-857.

Lou, H., Luo, W. and Strong, D. (2000), "Perceived critical mass effect on groupware acceptance", *European Journal of Information System*, Vol. 9 No. 2, pp. 91-103.

Lu, H.P. and Hsiao, K.L. (2007), "Understanding intention to continuously share information on weblogs", *Internet Research*, Vol. 17 No. 4, pp. 345-361.

Lu, H.P. and Wang, S.M. (2008), "The role of internet addiction in online game loyalty: an exploratory study", *Internet Research*, Vol. 18 No. 5, pp. 499-519.

Lu, J., Yu, C., Liu, C. and Yao, J.E. (2003), "Technology acceptance model for wireless internet", *Internet Research*, Vol. 13 No. 3, pp. 206-222.

Markus, M.L. (1987), "Toward a 'critical mass' theory of interactive media: universal access, interdependence and diffusion", *Communication Research*, Vol. 14 No. 5, pp. 491-511.

Mathieson, K. (1991), "Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior", *Information Systems Research*, Vol. 2 No. 3, pp. 173-191.

Mauri, M., Cipresso, P., Balgera, A., Villamira, M. and Riva, G. (2011), "Why is Facebook so successful? Psychophysiological measures describe a core flow state while using Facebook", *Cyberpsychology, Behavior and Social Networking*, Vol. 14 No. 12, pp. 723-731.

Nelson, R.R., Todd, P.A. and Wixom, B.H. (2005), "Antecedents of information and system quality: an empirical examination within the context of data warehousing", *Journal of Management Information Systems*, Vol. 21 No. 4, pp. 199-235.

Novak, T.P., Hoffman, D.L. and Yung, Y.F. (2000), "Measuring the customer experience in online environments: a structural modeling approach", *Marketing Science*, Vol. 19 No. 1, pp. 22-42.

Nunnally, J.C. (1987), *Psychometric Theory*, McGraw-Hill, New York, NY.

O'Cass, A. and Carlson, J. (2010), "Examining the effects of website induced flow in professional sporting team web-sites", *Internet Research*, Vol. 20 No. 2, pp. 115-134.

Premkumar, G., Ramamurthy, K. and Liu, H.N. (2008), "Internet messaging: an examination of the impact of attitudinal, normative, and control belief systems", *Information & Management*, Vol. 45 No. 7, pp. 451-457.

Qin, H., Rau, P.-L.P. and Salvendy, G. (2009), "Measuring player immersion in the computer game narrative", *International Journal of Human-Computer Interaction*, Vol. 25 No. 2, pp. 107-133.

Scarpi, D. (2012), "Work and fun on the internet: the effects of utilitarianism and hedonism online", *Journal of Interactive Marketing*, Vol. 26 No. 1, pp. 53-67.

Schlosser, A.E. (2003), "Experiencing products in the virtual world: the role of goal and imagery in influencing attitudes versus purchase intentions", *Journal of Consumer Research*, Vol. 30 No. 2, pp. 184-198.

Senecal, S., Gharbi, J.E. and Nantel, J. (2002), "The influence of flow on hedonic and utilitarian shopping values", *Advances in Consumer Research*, Vol. 29 No. 1, pp. 483-484.

Shang, R.A., Chen, Y.C. and Shen, L. (2005), "Extrinsic versus intrinsic motivations for consumers to shop on-line", *Information & Management*, Vol. 42 No. 3, pp. 401-413.

Sicilia, M., Ruiz, S. and Tomaseti, E. (2004), "The moderating effect of flow state on web site effectiveness", *Australian and New Zealand Marketing Academy Conference*, November 2-9, Wellington.

Slyke, C.V., Ilie, V., Lou, H. and Stafford, T. (2007), "Perceived critical mass and the adoption of a communication technology", *European Journal of Information Systems*, Vol. 16 No. 3, pp. 270-283.

Storgårds, J.H. (2011), "The influence of the hedonic and utilitarian value of digital games on product recommendation", *The Seventeenth Americas Conference on Information Systems, August 4-7, Detroit, MI.*

Storgårds, J.H., Tuunainen, V.K. and Öörni, A. (2009), "The hedonic and utilitarian value of digital games at product category level", *The Seventeenth European Conference on Information Systems, June 8-10, Verona.*

Taylor, S. and Todd, P. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No. 2, pp. 144-176.

Thompson, R.L., Higgins, C.A. and Howell, J.M. (1991), "Personal computing: toward a conceptual model of utilization", *MIS Quarterly*, Vol. 15 No. 1, pp. 125-143.

To, P., Liao, C. and Lin, T. (2007), "Shopping motivations on internet: a study based on utilitarian and hedonic value", *Technovation*, Vol. 27 No. 12, pp. 774-787.

Trevino, L.K. and Webster, J. (1992), "Flow in computer-mediated communication", *Communication Research*, Vol. 15 No. 5, pp. 539-573.

Venkatesh, V. and Bala, H. (2008), "Technology acceptance model 3 and a research agenda on interventions", *Decision Sciences*, Vol. 39 No. 2, pp. 273-315.

Venkatesh, V. and Morris, M. (2000), "Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior", *MIS Quarterly*, Vol. 24 No. 1, pp. 115-139.

Venkatesh, V., Morris, M.G. and Ackerman, P.L. (2000), "A longitudinal field investigation of gender differences in individual technology adoption decision making processes", *Organizational Behavior and Human Decision Processes*, Vol. 83 No. 1, pp. 33-60.

Voss, K.E., Spangenberg, E.R. and Grohmann, B. (2003), "Measuring the hedonic and utilitarian dimensions of consumer attitude", *Journal of Marketing Research*, Vol. 40 No. 3, pp. 310-320.

Wakefield, R.L. and Whitten, D. (2006), "Mobile computing: a user study on hedonic/utilitarian mobile device usage", *European Journal of Information Systems*, Vol. 15 No. 3, pp. 292-300.

Wan, C.S. and Chiou, W.B. (2007), "The motivations of adolescents who are addicted to online games: a cognitive perspective", *Adolescence*, Vol. 42 No. 165, pp. 179-197.

Wang, L.C., Baker, J., Wagner, J.A. and Wakefield, K. (2007), "Can a retail web site be social?", *Journal of Marketing*, Vol. 71 No. 3, pp. 143-157.

Webster, J., Trevino, L.K. and Ryan, L. (1993), "The dimensionality and correlates of flow in human computer interactions", *Computers in Human Behavior*, Vol. 9 No. 4, pp. 411-426.

Westland, J.C. (2010), "Lower bounds on sample size in structural equation modeling", *Electronic Commerce Research and Applications*, Vol. 9 No. 6, pp. 476-487.

Wu, J. and Liu, D. (2007), "The effects of trust and enjoyment on intention to play online games", *Journal of Electronic Commerce Research*, Vol. 8 No. 2, pp. 128-140.

Yee, N. (2006), "Motivations for play in online games", *Cyber Psychology & Behavior*, Vol. 9 No. 6, pp. 772-775.

Zaman, M., Anandarajan, M. and Dai, Q. (2010), "Experiencing flow with instant messaging and its facilitating role on creative behaviors", *Computers in Human Behavior*, Vol. 26 No. 5, pp. 1009-1018.

Zhou, T. (2011), "Understanding online community user participation: a social influence perspective", *Internet Research*, Vol. 21 No. 1, pp. 67-81.

Zhou, T. and Lu, Y. (2011), "Examining mobile instant messaging user loyalty from the perspectives of network externalities and flow experience", *Computers in Human Behavior*, Vol. 27 No. 2, pp. 883-889.

Appendix. Measurement items

Utilitarian outcome expectations (UOE)
(UOE1) If I play online games, my colleagues will perceive me as competent.
(UOE2) If I play online games, I will increase my sense of accomplishment.
(UOE3) If I play online games, I will increase my chances of obtaining an upgrade.
(UOE4) If I play online games, I will be seen as having higher status by my peers.
(UOE5) If I play online games, I will increase my chances of getting a reward (e.g. virtual currencies and experience points).

Hedonic outcome expectations (HOE)
(HOE1) If I play online games, I will experience enjoyment.
(HOE2) If I play online games, I will feel pleasure.
(HOE3) If I play online games, I will have fun.

Subjective norm (SN)
(SN1) People (peers and online games experts) important to me supported my play of online games.
(SN2) People who influenced my behavior wanted me to play online games instead of any alternative means.
(SN3) People whose opinions I valued preferred that I play online games.

Critical mass (CM)
(CM1) Most people in my group play an online game frequently.
(CM2) Most people in my community play an online game frequently.
(CM3) Most people in my class/office play an online game frequently.

Peer influence (PI)
(PI1) My friend would think that I should play an online game.
(PI2) Generally speaking, I want to do what my friends think I should do.
(PI3) My classmates would think that I should play an online game.
(PI4) Generally speaking, I want to do what my classmates think I should do.

External influence (EI)
(EI1) I read/saw news reports that playing online games was a good way of entertainment.
(EI2) The popular press depicted a positive sentiment for playing online games.
(EI3) Mass media reports influenced me to try out playing online games.

Flow (FL)
(FL1) Do you think you have ever experienced flow in playing an online game?
(FL2) In general, how frequently would you say you have experienced "flow" when you play an online game.
(FL3) Most of the time I play an online game I feel that I am in flow.

Continuance intention (CI)
(BI1) I plan to play online games in the future.
(BI2) I intend to continue playing online games in the future.
(BI3) I expect my play of online games to continue in the future.

About the authors

I-Cheng Chang is currently an Assistant Professor of Accounting at the National Dong Hwa University. He received his PhD degrees in accounting and information technology from the National Chung Cheng University. His direction is focussing on enterprise resource planning,

information technology governance and computer auditing. He has published research papers in some journals such as *Decision Support Systems*, *Information Systems Frontier*, and *Information Systems Management*. Professor I-Cheng Chang is the corresponding author and can be contacted at: icc@mail.ndhu.edu.tw

Dr Chuang-Chun Liu is a Research Fellow in the Institute of Information Management at the National Chiao Tung University. She received the PhD degree from the Department of Information Management, National Chung Cheng University. Her current research interests include electronic commerce, online consumer behavior, internet marketing, and electronic business. She has published papers in *International Journal of Information Management*, *Electronic Commerce Research and Applications*, *Online Information Review*, *Cyberpsychology, Behavior, and Social Networking*, *Journal of e-Business*, and other refereed journals and conference proceedings.

Dr Kuanchin Chen is a Professor of Computer Information Systems at the Western Michigan University. Dr Chen's research interests include electronic business, privacy and security, online behavioral issues (e.g. interactivity, dependency and tracking/protection), internet frauds, usability, data mining, business analytics and human computer interactions. He has published articles in journals and other academic publication outlets, including *Decision Support Systems*, *Information & Management*, *IEEE Transactions on Systems, Man, and Cybernetics*, *Journal of Database Management*, *Communications of the Association for Information Systems (CAIS)*, *Electronic Commerce Research and Applications*, *Journal of Global Information Management*, *DATA BASE for Advances in Information Systems*, *IEEE Transactions on Education*, *Decision Sciences Journal of Innovative Education*, *Journal of Computer Information Systems* and many others. Dr Chen has received several research and teaching awards, including department, university and US Congress-supported Fulbright awards. He currently serves on the editorial or advisory boards of *Information Resources Management Journal*, *International Journal of Information Systems and Change Management*, *Journal of Website Promotion*, *Communications of the ICISA*, and IGI Global (formerly Idea Group).