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

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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 websites 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 focusing 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 provide 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.
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; Storgård et al., 2009; Storgård, 2011). Storgård (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. Storgård 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)
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 website 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.

\[ H_{9a}. \text{Flow positively moderates the relationship between hedonic outcome expectations and continuance intention to play online games.} \]

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 website 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:

\[ H_{9b}. \text{Flow positively moderates the relationship between utilitarian outcome expectations and continuance intention to play online games.} \]
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 \( \alpha \) 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.
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 \((4 \times 10)\) as the minimum sample size requirement.

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

\[
\hat{n} \geq 50r^2 - 450r + 1,100
\]

\(\hat{n}\) 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.

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<td></td>
<td>Wireless</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>2</td>
<td>1.2</td>
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<tr>
<td>Playing online game experiences</td>
<td>&lt;1</td>
<td>25</td>
<td>15.1</td>
</tr>
<tr>
<td>(Year)</td>
<td>1-2</td>
<td>17</td>
<td>10.2</td>
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<tr>
<td></td>
<td>2-3</td>
<td>23</td>
<td>13.9</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>20</td>
<td>12.0</td>
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<tr>
<td></td>
<td>4-5</td>
<td>20</td>
<td>12.0</td>
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<tr>
<td></td>
<td>5-6</td>
<td>10</td>
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<tr>
<td></td>
<td>&gt;6</td>
<td>51</td>
<td>30.7</td>
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Table I. Descriptive statistics of respondents

Intention to play online games
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 $\alpha$, composite reliability and average variance extracted (AVE), as well as the square root of the AVE.

As the table shows, both the Cronbach’s $\alpha$ 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.
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.
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:

$$f^2 = \frac{R^2_{\text{included}} - R^2_{\text{excluded}}}{1 - R^2_{\text{included}}}$$  \hspace{1cm} (1)

where $f^2$ is the overall effect size for the interaction, $R^2_{\text{included}}$ is the $R^2$ value of a dependent construct when the examined independent construct is included in the model, and $R^2_{\text{excluded}}$ is the $R^2$ value of a dependent construct when the examined independent construct is excluded from the model.
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.

<table>
<thead>
<tr>
<th>Model</th>
<th>$R^2$</th>
<th>$f$-statistics</th>
<th>$f$-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline model (without flow)</td>
<td>0.686</td>
<td></td>
<td>0.554</td>
</tr>
<tr>
<td>Interaction effect model</td>
<td>0.798</td>
<td>0.475</td>
<td></td>
</tr>
<tr>
<td>Competing model</td>
<td>0.702</td>
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</table>

**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 sharpening of the mind.

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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.

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