How to attract Chinese online game users

An empirical study on the determinants affecting intention to use Chinese online games

Liu Fan
School of Management/Management Research Institute, Kyung Hee University, Seoul, Korea
Ja-Chul Gu
Korea Institute of Industrial Technology (KIITECH), Cheonan, Korea
Yung-Ho Suh
SMEs Center, School of Management/Management Research Institute, Kyung Hee University, Seoul, Korea, and
Sang-Chul Lee
Department of Business Administration, Korea Christian University, Seoul, Korea

Abstract

Purpose – The purpose of this research is to develop and test a model explaining users' intention to adopt online games in China. Through theories from diverse fields of information systems research, the authors aim to examine and validate antecedents of users' intentions to play online games.

Design/methodology/approach – The model proposes subjective norms and perceived control as antecedents to technology acceptance model (TAM) related beliefs, while suggesting convenience of operator, reality of design, provision of information and sense of belonging as antecedents of flow. The authors study the causal relations between the antecedents and usage intention by using structural equation modeling (SEM) to test the causalities in the proposed model.

Findings – The results indicate that perceived usefulness (PU), perceived ease of use (PEOU), flow and subjective norms are direct predictors of Chinese online games users' intentions. Subjective norm and sense of belonging are shown to be important predictors of PU, while provision of information reveals an important negative influence on PU. At the same time, system quality shows no significant influence on PU. Perceived control and convenience of operator are both antecedents of PEOU. Furthermore, except for the sense of belonging, the proposed four antecedents of flow are tested for their effect on PU.

Originality/value – This research systematically includes relevant antecedents in MIS research to test online game users' intention to adopt online games. It also provides some managerial insights that can guide Chinese online game companies to improve their games to attract users, and help foreign online game companies to make strategic plans to enter the huge Chinese online game market.

Keywords Chinese online games, Flow, Technology acceptance model, Computer games, China, User studies

Paper type Research paper

1. Introduction

With the development of internet, the high-fidelity computer, and multimedia technology, the global online game industry has been growing rapidly. The value of the

www.mana

global online game market increased from US$2.126 billion to US$8.446 billion from year 2003 to 2008, and is predicted to reach US$13.1 billion by 2012 (DFC Intelligence, 2007). Along with the rapid global development, the online game market in the Asia Pacific is gaining significant revenues. China is experiencing fast growth and has become the largest potential market in the global online game industry (Korea Institute for Electronic Commerce (KIEC), 2005). In 1999, online games were introduced to the Chinese market and by 2007 had 40.17 million users, producing 10.57 billion RMB in revenue. This represents an increase of 61.5 percent compared with the fiscal year of 2006 (www.cgigc.com.cn/). The development of Chinese online game industry is attractive to companies both in China and abroad. To understand how to interact with customers and deliver their service, it is necessary to understand Chinese users' intention to adopt online games in China.

However, previous studies have been conducted mainly from the technological and psychological perspective of online games (Lee *et al.*, 2006). The main concern of technological research was to design and develop a more attractive and effective online game environment (Woodcock, 1999). However, no matter how sophisticated the technologies applied, users would not revisit the game site if it failed to reflect their needs. Furthermore, the results of psychological research were not generalized into business because it focussed on negative effects caused by the game addiction (Lee *et al.*, 2006).

Therefore, it is necessary to analyze the technology acceptance factors of Chinese online game users. Previous studies have been conducted on users' intention to engage in online games based on Davis' technology acceptance model (TAM). Different from early TAM research focussed on increasing productivity (Davis, 1989; Dishaw and Strong, 1999; Yi and Jiang, 2007), research on online game (as an entertainment-oriented information technology (IT) has been argued that flow play an important part in online game acceptance. Thus, flow is added as a third endogenous variable influencing users' intention to play online games (Hsu and Lu, 2004; Heijden, 2004; Ha *et al.*, 2007). However, few studies focus on the determinants for flow (Lee *et al.*, 2004; Lee *et al.*, 2006). By this token, this research focusses on as antecedents of flow and proposes the convenience of operator, the reality of design, the provision of information and the sense of belonging (SB) as the antecedents of flow.

TAM provides a means to examine users' IT acceptance, but it is too general to explain specific IT preferences (Mathieson, 1991). Thus, an extended TAM may be relevant to explain users' online game acceptance. As TAM is deficient in explaining intention to use various forms of technology, it is suggested that an integration of various theoretical perspectives may provide a richer understanding of the target IT. Considering online games as the specific context, two factors influencing perceived usefulness (PU) and perceived ease of use (PEOU) are added based on the theory of planned behaviors (TPB). TPB argues that subjective norm and behavioral control influence behavior intentions. Behavior intentions are a function of an individual's attitude toward the behavior, the subjective norms surrounding the performance of the behavior and the individual's perception of the ease with which the behavior can be performed. By this, this research proposes subjective norms and perceived control as antecedents to TAM-related beliefs.

The purpose of this research is to develop and test a model explaining users' intention to adopt online games in China. Through theories from diverse fields of information systems research, the authors examine and validate antecedents of users' intentions to play online games. The model proposes subjective norms and perceived control as antecedents to TAM-related beliefs, while suggesting convenience of

operator, reality of design, provision of information and SB as antecedents of flow. The authors studied the causal relations between the antecedents and usage intention. This study uses a structural equation modeling (SEM) to test the causalities in the proposed model.

2. Theoretical background

2.1 TAM

Over the past two decades, scholars have become more interested to study the factors affecting intention to use the IT. Numerous models, such as theory of reasoned action (TRA), TAM and TPB, have been introduced. TAM is the most widely used model.

TAM builds on TRA, claiming that behavior is influenced by intentions to conduct a specific act, which are predicted by an individual's attitude and subjective norms (Ajzen and Fishbein, 1980). TAM suggests that an individual's intention of IT usage is influenced by his attitude toward the usage, which is predicted by PU and PEOU of the IT. In Davis (1989), PU is defined as "the extent to which one believes that using a particular system would enhance his or her job performance." PEOU is defined as, "the extent to which one believes that using a particular system would be free of effort" (Davis, 1989). TAM provides a quick and inexpensive way to gather information about individuals' perceptions of a system. However, the model does not explain specific factors influencing technology acceptance (Mathieson, 1991).

Ajzen (1991) accounted for conditions when an individual cannot completely control his own behavior and added perceived behavioral control to TRA, resulting in TPB. TPB is superior to TAM in that it provides more information about the factors users consider when making their choices (Mathieson, 1991). Concepts in TPB are usually appended as antecedents of the key constructs of TAM, in order to make it possible for TAM to explain more details about user acceptance and use (Venkatesh and Davis, 1996).

2.2 Flow

When studying chess players, rock climbers and dancers, the original concept of flow was introduced by Csikszentmihalyi (1988). Flow is defined as, "the holistic experience that people feel when they act with total involvement" (Csikszentmihalyi, 1988). When in the flow state, people become absorbed in their activity: their awareness is narrowed to the activity itself; they lose self-consciousness, and they feel in control of their environment. Such a concept has been extensively applied in studies of a broad range of contexts, such as sports, shopping, rock climbing, dancing, gaming and others (Csikszentmihalyi, 1988; Hsu and Lu, 2004).

The flow construct has been proposed as important for understanding consumer behavior with regard to online game. However, previous studies on flow were conducted in the context of the World Wide Web or the IT. Antecedents of flow mainly focussed on the World Wide Web and clustered on ease of use (Trevino and Webster, 1992; Skadberg and Kimmel, 2004; Hsu and Lu, 2004), telepresence (Hoffman and Novak, 1996; Novak *et al.*, 2000; Skadberg and Kimmel, 2004), skills (Trevino and Webster, 1992; Ghani, 1995; Hoffman and Novak, 1996; Novak *et al.*, 2000; Skadberg and Kimmel, 2004) and interactivity (Hoffman and Novak, 1996; Novak *et al.*, 2000; Skadberg and Kimmel, 2004).

Recently, flow has been argued to play an important role in online game acceptance. In addition to PU and PEOU, flow may be employed as an initial predictor to explain an individual's behavioral intention to play online games. Flow in online game, may be

defined as an extremely enjoyable experience in which an individual engages in an online game activity with total involvement, enjoyment, control, concentration and intrinsic interest (Hsu and Lu, 2004). However, few studies focus on the antecedents of flow (Lee *et al.*, 2006).

Hsu and Lu (2004) developed an extended TAM incorporating social influences and flow experience as belief-related constructs to predict users' acceptance of online games. They argued that PEOU is positively related to flow experience of playing an online game, and flow experience positively affects intention to play an online game.

Choi and Kim (2004) studied the factors influencing users' loyalty to online contents by using the concepts of customer loyalty, flow, personal interaction and social interaction. It is pointed out that personal interaction can be facilitated by providing appropriate goals, operators and feedback. Social interactions can be facilitated through appropriate communication channels and tools. They found that customers would have a higher level of loyalty if they had optimal experiences with the game, i.e. flow.

Lee *et al.* (2004) studied causalities among flow and customer loyalty in Korean online games, and to identify the factors by which flow are influenced. They conducted research on the Korean online game market, finding that the convenience of operator, the precision of information and the reality of design are critical factors influencing flow.

3. Research model and hypotheses
This section elaborates on the theoretical basis of this study. Given that an online game is both an IT and the channel through which users communicate with others in cyber space and pursue entertainment, technology-based and flow-based antecedents should influence the decision to adopt online game. The research model is depicted in Figure 1.

3.1 TAM
This research model adopted the original TAM relationship. The following TAM hypothesized relationships were proposed in the context of online games. Especially, original PU was defined as "enhance his or her job performance." In online game context, this study defined as "to pursue relaxation, gain pleasure, and make friends with others."

Building upon previous research, we state the hypothesis as follows:

H1. PEOU will positively affect the intention to play online games.

H2. PU will positively affect the intention to play online games.

H3. PEOU will positively affect PU of online games.

Antecedents of belief in TAM presented in this research are extracted from the variables of TPB. TPB is one of the most often used models to explain behavioral intention (Ajzen, 1991). Five concepts are generally included: attitude toward act or behavior, subjective norm, perceived behavioral control, behavioral intention and behavior (Ajzen, 1991). The concept of subjective norm is a supplementary factor to TAM for explaining the social influence (Nysveen *et al.*, 2005). Subjective norm is originally defined by Fishbein and Ajzen (1975) as the person's perception that most people who are important to him think that he should or should not perform the
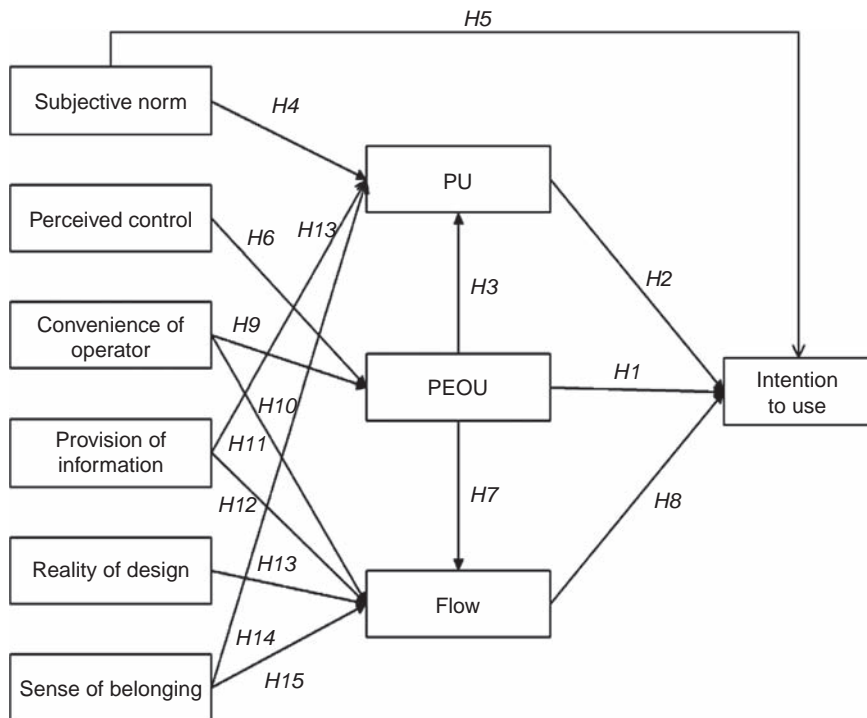
Figure 1.
Research model

behavior in question. In other words, an individual's behavior and thinking are influenced by friends, family or colleagues. Users who have less knowledge and experience about specific IT have been found to be more influenced by people around them (Venkatesh and Morris, 2000; Hu *et al.*, 2003). An online game is a type of multiple user technology. When users see the people around them playing a game or receive their recommendations, they may conclude that the game is "useful." At the same time, users are more likely to play the game once they perceive that their social circles think they should engage in this behavior (Ajzen and Fishbein, 1980). Therefore, we propose the following hypothesis:

H4. Subjective norm will positively affect PU.

H5. Subjective norm will positively affect the intention to play online games.

Davis pointed out that, although TAM provides a powerful means to predict acceptance, it is a serious limitation that TAM does not help understand and explain acceptance in ways that guide development beyond suggesting that system characteristics impact ease of use (Venkatesh, 2000). In order to bridge this, the construct of perceived control was proposed as the predictor of ease of use (Venkatesh, 2000). Perceived control is defined as, "perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991). Previous studies considered perceived behavioral control as either a separate belief affecting intention to use or an antecedent of PEOU and PU. Users with higher perceived control show higher perception about

ease of use, which in turn, indirectly affect on PU and intention (Venkatesh and Davis, 1996; Venkatesh, 2000; Agarwal and Karahanna, 2000; Ong *et al.*, 2004). Online games require users' skills. The more online game users consider a game easy to play, the higher they will evaluate the ease of use. Therefore, perceived control is being tested in the following hypothesis:

H6. Perceived control will positively affect PEOU.

3.2 Flow

Flow has been studied as an important antecedent for explaining users' intention to use entertainment-oriented ITs. Flow is expected to have a positive influence on intention to use, and it is perceived to be directly influenced by ease of use (Hsu and Lu, 2004). Consistent with previous research, we propose the following hypothesis:

H7. PEOU will positively affect flow.

H8. Flow will positively affect the intention to play online games.

Antecedents of flow have not been determined. Research of flow (Choi and Kim, 2004; Lee *et al.*, 2005) suggests that convenience of operator, reality of design, provision of information and SB may be antecedents of flow. Operators are the instruments given to players for problem solving in playing games. The purpose of an operator is to assist the user to achieve his or her goals while interacting with the system (Choi and Kim, 2004). We identified the convenience of the operator as the ease with which operators may be manipulated (Davis *et al.*, 1992). The higher convenience of operator helps the user to achieve their goal easily and to better interact with the system, which in turn brings a positive experience, i.e. flow. Thus, we propose:

H9. The higher convenience of operator will positively affect PEOU.

H10. The higher convenience of operator will positively affect flow.

Information is defined as the introduction provided on how to play the online games. Gamers who received more precise information about how to play the games tended to achieve online game goals and experience of flow more easily (Agarwal and Karahanna, 2000; Hagel and Armstrong, 1997). With more helpful and precise information, users can more easily earn rewards and receive peer recognition. Therefore, the higher provision of information has a positive influence on PU and flow:

H11. The higher provision of information will positively affect PU.

H12. The higher provision of information will positively affect flow

Online games differ from previous computer games because users interact via the internet and can simultaneously play with one another (Choi and Kim, 2004). The computer is merely a mediating tool connecting players within cyber space. Therefore it is important to have gamers feel their space is real (Chin *et al.*, 1997; Calantone and Zhao, 2000; Lewinski, 2000). The reality of design is defined as the design quality of the interface that makes gamers feel online games as part of the real world. Technological

researchers also consider design as an important determinant in developing successful online games. Thus, we presume that the higher reality of design will bring users higher sense of flow:

H13. The higher reality of design will positively affect flow.

Online games are groups of computer games in which many people can participate at the same time through online communication networks (Kim *et al.*, 2002; Lu and Wang, 2008). In this sense, gamers form a virtual community with potential for integration of member-generated content and communication (Bagozzi and Yi, 1998). An SB is essential to online game users in such virtual communities, as it arouses involvement, participation and interaction, which helps users to solve problems together (Agarwal and Karahanna, 2000). The higher SB helps users better solve the mission as a team, and provides users positive influence to flow:

H14. The higher SB will positively affect PU.

H15. The higher SB will positively affect flow.

4. Research method
4.1 Measurement
Multi-item measures for each construct were developed through the following process. First, a draft of the questionnaire was prepared by reviewing the literature. All of the statements were translated into Chinese and slightly modified to suit the context of online games. The response to the statements were measured on a seven-point Likert scale, ranging from strongly disagree (1) through neutral (4) to strongly agree (7). Based upon literature review and field interviews, 25 items for ten variables were finally selected. Adapted from research items in TAM-related research, perceived ease of use is measured by four items (PEOU1-4), PU by five items (PU 1-5), behavioral intention by two items (IU1-2). For the determinants of TAM, subjective norm is measured by four items (SN1-4), and perceived control by two items (PC1-2). Flow is measured by four items (FL1-4), convenience of operator by two items (CO1-2), provision of information by three items (PI1-3), reality of design by four items (RD1-4) and SB by four items (SB1-4).

4.2 Data collection
To test the model, we used a convenience sample of 410 online game users from several game rooms in China. The demographic statistics indicated that 74.1 percent were male and 25.9 percent were female; 46.3 percent of the respondents were between 19 and 22 years; 72.4 percent were from high school and undergraduate; 90.2 percent of the people would like to spend <50 yuan per month on online game. In total, 35.1 percent of respondents used internet for 2-3 years, and 31.2 percent used internet for 4-5 years. The time of using the internet per day and the time of using online games per day was equally distributed.

4.3 Research method
This research uses a two-step approach, which is the procedure recommended by Anderson and Gerbing (1988). First, confirmatory factor analysis was conducted to evaluate the validity of the measurement model. The validity of the measurement

model is evaluated by investigating convergent validity, reliability and discriminant validity. Second, the structural equation analysis was conducted to test the proposed structural model for online game players.

5. Results

5.1 Measurement model

The validity of the measurement model is evaluated by investigating convergent validity, reliability and discriminant validity. First, we conducted unconstrained confirmatory factor analysis by using AMOS 5.0 to evaluate convergent validity for all constructs, which included both antecedents and dependent variables. The purpose of convergent validity is to ensure unidimensionality of the multiple-item constructs and to eliminate unreliable items (Bollen, 1998). The convergent validity is evaluated by investigating the value of standardized factor loadings (FL) and standardized residual covariance (SRC). Items should load at least 0.60 (FL) and 0.50 (SRC) on their respective hypothesized component and all loadings need to be significant ($p < 0.05$, $t \geqslant 2.0$) (Bagozzi and Yi, 1998; Sujan et al., 1994). The result found that 10 items were eliminated: SN2, PI3, RD3, RD4, SB2, PEOU1, PU1, PU5, PL3, PL4, as shown in the Appendix.

After elimination, the value of the standardized FL for each item to its respective construct was significant ($p < 0.05$), and all loadings ranged from 0.714 to 0.964, as shown in the Appendix. The fit statistics for the initial model were weak, but for the final models, the fit statistics were good. The χ^2 of the model was 488.85 with df of 207, the ratio of χ^2 to df at 2.362, GFI at 0.915, AGFI at 0.876, NFI at 0.912, CFI at 0.947, RMR at 0.067 and RMSEA at 0.058 were acceptable.

Reliability for all items of a construct should be evaluated jointly by investigating composite reliability (CR) and the average variance extracted (AVE). For a construct to possess good reliability, CR should be at least 0.70 and the AVE should be at least 0.50 (Bagozzi, 1994; Baumgartner and Homburg, 1996; Hair et al., 1995; Steenkamp and van Trijp, 1991). As shown in Appendix, CR and AVE in final model were over 0.701 and 0.500, respectively.

Finally, we tested the discriminant validity to identify if the constructs differ from each other (Chin et al., 1997; Bollen, 1998). Discriminant validity was tested by comparing the inter-construct correlations with their respective variance extracted measures. Table I indicated that the inter-construct correlations (below the diagonal) and the square roots of the AVE (on the diagonal) of the constructs. It shows that all squared correlations between two constructs were less than the variance extracted

	SN	PC	CO	PI	RD	SB	PEOU	PU	FL	IU
SN	0.707									
PC	0.590	0.742								
CO	0.494	0.175	0.799							
PI	−0.431	−0.364	−0.215	0.776						
RD	0.357	0.476	0.168	−0.087	0.736					
SB	0.418	0.452	0.216	−0.329	0.471	0.712				
PEOU	0.493	0.584	0.417	−0.378	0.357	0.341	0.776			
PU	0.502	0.534	0.398	−0.436	0.386	0.444	0.536	0.773		
FL	0.403	0.335	0.373	−0.423	0.233	0.175	0.425	0.407	0.780	
IU	0.666	0.524	0.364	−0.328	0.421	0.389	0.585	0.536	0.496	0.776

Table I.
Correlations and square roots of average variance extracted

measures of both constructs. The results indicated that the discriminant validity of the model constructs was satisfactory (Turel *et al.*, 2007; Ahn *et al.*, 2007).
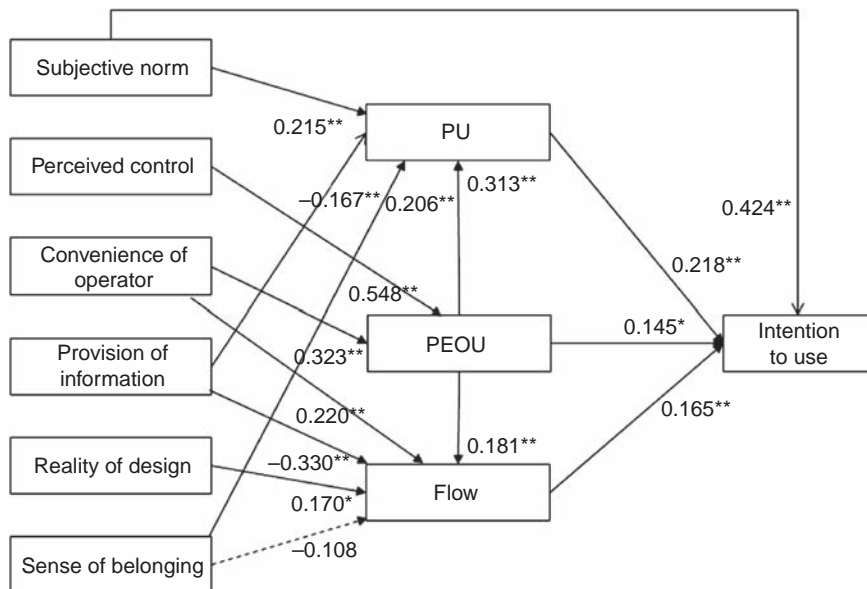
5.2 Structural model
After the measurement model was refined, the structural model was evaluated and it was well converged. The results indicated that the χ^2 of the structural model at 532.4 with df of 222, the ratio of χ^2 to df at 2.398, GFI at 0.909, AGFI at 0.877, NFI at 0.905, CFI at 0.941, RMR at 0.080 and RMSEA at 0.058 were acceptable. Squared multiple correlations were: perceived ease of use, 46.8 percent; PU, 44.1 percent; flow, 30.7 percent; behavioral intention, 55.6 percent.

The results of structural model analysis are shown in Figure 2. All the paths are significant except one hypothesis. For flow and its determinants, SB showed no significant influence on flow (FL).

6. Discussion
The purpose of this research is to examine and validate determinants of Chinese user's intentions to adopt online games. Through theories from relevant information systems research, this research proposed the subjective norm and perceived control as antecedents to PU and PEOU, while suggesting convenience of operator, reality of design, provision of information and SB as antecedents of flow. By using the SEM for analysis, the research tested the causal relations of these constructs, and they may be summarized as follows.

First, the factors influencing Chinese online gamers' intention were subjective norm, PU, PEOU and flow. Interestingly, this research found that subjective norm has the most important influence on behavior intention. Many studies have verified the direct

Notes: CMIN: 532.4, df: 222, *p*: 0.000, DMIN/df: 2.398, GFI: 0.909, AGFI: 0.877, NFI: 0.905, CFI: 0.941, RMR: 0.080, RMSEA: 0.058; **$p < 0.01$, *$p < 0.05$

Figure 2.
Results of structural
equation model

influence of subjective norm to behavioral intention. As is pointed out, potential users regard a significant person's attitude as one of the decision criteria (Yu *et al.*, 2005). Online games are a form of interactive electronic games, and users report high influence from their social groups and are more likely to be affected by positive word of mouth from their friends, family and other adopters. Different from previous research studying for entertainment-oriented IT, PEOU lost its dominant role in predicting behavioral intention. This could be explained as that this study was tested by online game users who were familiar with it, the influence power of PEOU might be lower than expected. Other studies have reported that with the increasing experience of IT, PEOU has less or no influence on intention (Venkatesh, 2000; Venkatesh and Morris, 2000).

Second, subjective norm and SB influenced PU. Playing online games was regarded as a means for sharing information and pleasure, which was influenced by the social environment. In other words, users played online games to get or share relaxation, playfulness, fun, chat, etc. with people around them.

Third, perceived control and convenience of operator had a significant influence on PEOU. This was consistent with the prior research that strong positive or negative beliefs about perceived control influenced PEOU of information systems (Venkatesh and Davis, 1996). Moreover, the convenience of operators to play online games could increase online game users perception of the ease of use.

Fourth, the paths from convenience of operator, reality of design and provision of information to flow were significant while that from SB was not significant. Specifically, the results showed that provision information negatively influenced flow. This is due to that most of the online game sites and community sites for online game users in China failed to provide the precise information for gaming (iResearch, 2003). This imprecise information would in turn have influenced online game users' sense of community, because it made it difficult to obtain needed information and to find people with common concerns. Therefore, the SB had no influence on flow.

7. Conclusion and implication
This study examined the influences on the acceptance of Chinese online games by proposing a new model. The results were consistent with existing TAM and flow studies. These results explained the factors influencing acceptance of online games by users in the fast-growing Chinese market. These results could also provide several insights.

First, intention was influenced by PU, and PU was influenced by subjective norm and sense of community. This study indicated that PU was an important predictor, which was consistent with most previous research. When users play online games, they communicate with others and obtain pleasure from their interactions. Interpersonal interactions among game players create a community in which business value can be created by improving customer loyalty (Hagel and Armstrong, 1997). Therefore, more functions which enable users communicate with each other more smoothly should be provided (Hsu and Lu, 2004).

Second, though flow is not more important than PU, in terms of its influence on intention to use, it is a significant predictor of intention to use online games. To improve the influence of flow and attract more users, more functions should be added. If the cyber space is designed similar to the real world, users may achieve flow easier. Second, the convenience and individualization of characters and items used to play online games may enhance online game users' perception of the ease of use and enable them to achieve flow. Third, more precise information provided in the game may not only improve the gamers' ability but also help them to achieve their entertainment goal and even help them achieve flow.

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. 665-94.

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. 263-75.

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

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.

Anderson, J. and Gerbing, D.W. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-23.

Bagozzi, R.P. (1994), "ACR fellow speech", Vol. 21 No. 1, pp. 8-11.

Bagozzi, R.P. and Yi, Y. (1998), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16 No. 1, pp. 74-94.

Baumgartner, H. and Homburg, C. (1996), "Applications of structural equation modeling in marketing and consumer research: a review", *International Journal of Research in Marketing*, Vol. 13 No. 2, pp. 139-61.

Bollen, K.A. (1998), *Structural Equations with Latent Variables*, Wiley, New York, NY.

Calantone, R.J. and Zhao, Y.S. (2000), "Joint ventures in China: a comparative study of Japanese, Korean, and US partners", *Journal of International Marketing*, Vol. 9 No. 1, pp. 1-23.

Chin, W.W., Gopal, A. and Salisbury, W.D. (1997), "Advancing the theory of adaptive structuration: development of a scale to measure faithfulness of appropriation", *Information Systems Research*, Vol. 8 No. 4, pp. 342-67.

Choi, D.S. and Kim, J.W. (2004), "Why people continue to play online games: in search of critical design factors to increase customer loyalty to online contents", *Cyber Psychology & Behavior*, Vol. 7 No. 1, pp. 11-24.

Csikszentmihalyi, M. (1988), *Optimal Experience: Psychological Studies of Flow in Consciousness*, HarperCollins, New York, NY.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-40.

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. 1111-32.

DFC Intelligence (2007), *Online Game Market Forecasts 2007*, DFC Intelligence, San Diego, CA.

Dishaw, M.T. and Strong, D.M. (1999), "Extending the technology acceptance model with task-technology fit constructs", *Information & Management*, Vol. 36 No. 1, pp. 9-21.

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

Ghani, J.A. (1995), "Flow in human computer interactions: test of a mode", in Carey, J. (Ed.), *Human Factors in Information Systems: Emerging Theoretical Bases*, Ablex Publishing Corporation, Norwood, MA, pp. 291-311.

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. 276-86.

Hagel, J. III and Armstrong, A. (1997), *Net Gain: Expanding Markets through Virtual Communities*, Harvard Business School Press, Cambridge, MA.

Hair, J.J, Anderson, J., Norman, J. and Black, W. (1995), *Multivariate Data Analysis with Readings*, 4th ed., Prentice-Hall, Englewood Cliffs, NJ.

Heijden, H. (2004), "User acceptance of hedonic information systems", *MIS Quarterly*, Vol. 28 No. 4, pp. 695-704.

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.

Hsu, C.L. and Lu, H.P. (2004), "Why do people play online games? An extended tam with social influences and flow experience", *Information & Management*, Vol. 41 No. 7, pp. 853-68.

Hu, P.J., Clark, T.H.K. and Ma, W.W. (2003), "Examining technology acceptance by school teachers: a longitudinal study", *Information & Management*, Vol. 41 No. 2, pp. 227-41.

iResearch (2003), *iResearch China Online Game Users Survey Report 2003*, iResearch, Shanghai (in Chinese).

Kim, K.H., Park, D.Y., Moon, H.I. and Chun, H.C. (2002), "E-lifestyle and motives to use online games", *Irish Marketing Review*, Vol. 15 No. 2, pp. 71-7.

Korea Institute for Electronic Commerce (KIEC) (2005), *2005 e-Business White Paper*, KIEC, Seoul (in Korean).

Lee, H.Y., Lee, Y.K. and Kwon, D. (2005), "The intention to use computerized reservation systems: the moderating effects of organizational support and supplier incentive", *Journal of Business Research*, Vol. 58, pp. 1552-61.

Lee, S., Moon, J., Kim, J. and Suh, Y. (2006), "Application of a two-level self organizing map for Korean online game market segmentation", *Lecture Notes in Computer Science*, Vol. 4109 No. 4109, pp. 808-16.

Lee, S., Suh, Y., Kim, J. and Lee, K. (2004), "A cross-national market segmentation of online game industry using SOM", *Expert Systems with Applications*, Vol. 27 No. 4, pp. 559-70.

Lewinski (2000), *Developer's Guide to Computer Game Design*, Wordware Publishing Inc, Plano, TX.

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

Mathieson, K. (1991), "Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior", *Information System Research*, Vol. 84 No. 1, pp. 123-36.

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

Nysveen, H., Pedersen, P.E. and Thorbjørnsen, H. (2005), "Intentions to use mobile services: antecedents and cross-service comparisons", *Academy of Marketing Science*, Vol. 33 No. 3, pp. 330-46.

Ong, C., Lai, J. and Wang, Y. (2004), "Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies", *Information & Management*, Vol. 41 No. 6, pp. 795-804.

Skadberg, Y.X. and Kimmel, J.R. (2004), "Visitors' flow experience while browsing a web site: its measurement, contributing factors and consequences", *Computers in Human Behavior*, Vol. 20 No. 3, pp. 403-22.

Steenkamp, J.E.M. and van Trijp, H.C.M. (1991), "The use of LISREL in validating marketing constructs", *International Journal of Research in Marketing*, Vol. 8 No. 4, pp. 283-99.

Sujan, H., Weitz, B.A. and Kumar, N. (1994), "Learning, orientation, working smart, and effective selling", *Journal of Marketing*, Vol. 58 No. 3, pp. 39-52.

Trevino, L.K. and Webster, J. (1992), "Flow in computer-mediated communication: electronic mail and voice mail evaluation and impacts", *Communication Research*, Vol. 19 No. 19, pp. 539-73.

Turel, O., Serenko, A. and Bontis, N. (2007), "User acceptance of wireless short messaging services: deconstructing perceived value", *Information & Management*, Vol. 44 No. 1, pp. 63-73.

Venkatesh, V. (2000), "Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model", *Information System Research*, Vol. 11 No. 4, pp. 342-65.

Venkatesh, V. and Davis, F.D. (1996), "A model of the antecedents of perceived ease of use: development and test", *Decision Sciences*, Vol. 27 No. 3, pp. 451-81.

Venkatesh, V. and Morris, M.G. (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. 115-39.

Woodcock, W. (1999), "Game AI: the state of the industry", Gamasutra, available at: www.gamasutra.com/features/19990820/game_ai_01.html

Yi, C. and Jiang, Z.H. (2007), "The antecedents of online consumers' perceived usefulness of websites: a protocol analysis approach, human-computer interaction", Part IV, HCII, LNCS 4553, pp. 142-7.

Yu, J., Ha, I., Choi, M. and Rho, J. (2005), "Extending the TAM for a T-commerce", *Information & Management*, Vol. 42 No. 7, pp. 965-76.

Further reading

Ajzen, I. (1985), "From intentions to actions: a theory of planned behavior", in Kuhl, J. and Beckmann, J. (Eds), *Action Control: From Cognition to Behavior*, Springer-Verlag, New York, NY, pp. 11-39.

CGIAC (2007), "2006 China online game industry report", available at: www.cgiac.17173.com

DeLone, W.H. and McLean, E.R. (1992), "Information systems success: the quest for the dependent variable", *Information Systems Research*, Vol. 3 No. 1, pp. 60-95.

DeLone, W.H. and McLean, E.R. (2003), "The DeLone and McLean model of information systems success: a ten-year update", *Journal of Management Information Systems*, Vol. 19 No. 4, pp. 9-30.

Gefen, D. (2003), "TAM or just plain habit: a look at experienced online shoppers", *Journal of End User Computing*, Vol. 15 No. 3, pp. 1-13.

Gefen, D. and Straub, D.W. (2003), "Managing user trust in b2c e-services", *E-Service Journal*, Vol. 2 No. 2, pp. 7-24.

Gefen, D., Karahanna, E. and Straub, D.W. (2003a), "Trust and TAM in online shopping: an interacted model", *MIS Quarterly*, Vol. 27 No. 1, pp. 51-90.

Gefen, D., Karahanna, E. and Straub, D.W. (2003b), "Inexperience and experience with online stores: the importance of TAM and trust", *IEEE Transactions on Engineering Management*, Vol. 50 No. 3, pp. 307-21.

Lee, I.S., Choi, B.R., Kim, J.W. and Hong, S.J. (2007), "Culture-technology fit: effects of cultural characteristics on the post-adoption beliefs of mobile internet users", *International Journal of Electronic Commerce*, Vol. 11 No. 4, pp. 11-51.

Lin, Z.K. (2002), "A study of participation motivation and satisfaction of online game-linage", thesis, National Cheng Kung University, Tainan.

Liu, C., Marchewka, J.T., Lu, J. and Yu, C.S. (2005), "Beyond concern – a privacy-trust-behavioral intention model of electronic commerce", *Information & Management*, Vol. 42 No. 2, pp. 289-304.

Moon, J. and Kim, Y. (2001), "Extending the TAM for a world-wide-web context", *Information & Management*, Vol. 38 No. 4, pp. 217-30.

Shih, H.P. (2004), "An empirical study on predicting user acceptance of e-shopping on the Web", *Information & Management*, Vol. 41 No. 3, pp. 351-68.

Taylor, S. and Todd, P.A. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No. 2, pp. 144-76.

Teo, T., Lim, V. and Lai, R. (1999), "Intrinsic and extrinsic motivation in internet usage", *Omega*, Vol. 27 No. 1, pp. 25-37.

Venkatesh, V. and Davis, F.D. (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46 No. 2, pp. 186-204.

Vijayasarathy, L.R. (2004), "Predicting consumer intentions to use online shopping: the case for an augmented technology acceptance model", *Information & Management*, Vol. 41 No. 6, pp. 747-62.

Wixom, B.H. and Todd, P.A. (2005), "A theoretical integration of user satisfaction and technology acceptance", *Information Systems Research*, Vol. 16 No. 1, pp. 85-102.

Appendix

Items		Wording	FL	CR	AVE
SN	SN1	People around me (friends or colleagues) think that I should play online games	0.789	0.749	0.500
	SN3	People around me (friends or colleagues) are usually playing online games	0.839		
	SN4	People around me (friends or colleagues) think that it is good that I play online games	0.744		
PC	PC1	I don't feel it difficult to play online games	0.836	0.710	0.551
	PC2	I don't need help from others when playing online games	0.817		
CO	CO1	I can manipulate the characters and items to play online games	0.742	0.776	0.638
	CO2	With many functions of the characters and items, I can play games more easily	0.964		
PI	PI1	Games provide me with correct information about what I do	0.714	0.749	0.603
	PI2	Games provide me with sufficient information on how to play it	0.937		
RD	RD1	Avatar and the interface of game is similar to the real world	0.864	0.701	0.542
	RD2	The interface of game is harmonious	0.742		
SB	SB1	When I play online games, I believe that the members of games are my colleagues	0.751	0.755	0.507
	SB3	I communicate with members actively	0.788		
	SB4	I believe that I belong to the game site	0.801		
PEOU	PEOU2	It is easy to learn how to play online games	0.843	0.820	0.603
	PEOU3	It is easy to find the service that I want when playing online games	0.878		
	PEOU4	It is easy to learn to operate on online games	0.851		
Instructions: The purpose for playing online game is for pursuing relaxation, gaining pleasure and making friends with others					
PU	PU2	Playing online games helps me more efficiently achieve the goal	0.862	0.816	0.597
	PU3	Playing online games helps me more easily achieve the goal	0.857		
	PU4	Playing online games is useful to achieve the goal	0.862		
FL	FL1	When I play games, I feel pleasure and fun	0.78	0.756	0.608
	FL2	When I play games, I perceive curiosity	0.843		
IU	IU1	I intend to play online games continuously in the future	0.834	0.751	0.602
	IU2	I will recommend others to play online games	0.814		

Table AI.
Results of measurement model

About the authors
Liu Fan is currently a PhD Candidate at Kyung Hee University, and is working as a Lecturer teaching Management Information Systems in the School of Management, Kyung Hee University. Her research interest includes consumer behaviour in e-business, management Information Systems and quality management. Liu Fan has had many papers published in international journals and conferences. Her previous work has been published in *Cyber Psychology, Behavior, and Social Networking*, *International Journal of E-education*, *E-business*, *E-management and E-learning*, *Journal of Korean Society for Quality Management*, and etc.

Ja-Chul Gu is a Researcher of Technology Human Resource Support for SMEs Center at Korea Institute of Industrial Technology (KIITECH). He holds BS from Dongseo University, and MBA and PhD in Management Information Systems from Kyung Hee University. He was a researcher of Korea Advanced Institute of Science and Technology (KAIST). His research interests include e-business strategies, e-commerce, data mining, customer relationship management and multigroup structural equation modelling (MSEM). He has published papers which have appeared in *Lecture Notes in Computer Science*, *Journal of MIS Research*, *Korean Management Review*, *Journal of the Korea Society for Quality Management* and *Information Systems Review*, etc.

Yung-Ho Suh is a Professor of School of Business Administration at the Kyung Hee University. He holds a BBA from Seoul National University, a MS in Department of Management Science from Korea Advanced Institute of Science and Technology (KAIST) and a PhD in Management Information System from School of Management at Syracuse University. His teaching and research specialties are in the fields of e-business, e-commerce, management information systems and quality management. He has published papers, which have appeared in *Journal of Accounting and Business Research*, *Expert Systems with Applications: International Journal*, *International Journal of Intelligent Systems in Accounting, Finance, and Management*, *Journal of Computer Information System*, *Business Process Management Journal*, *Korean Journal of MIS Research*, *Korean Management Review*, *Journal of the Korea Society for Quality Management*, *Information Systems Review*, etc.

Sang-Chul Lee is an Assistant Professor of Department of Management Information Systems at Korea Christian University, Korea. He holds BS from Asia United Theological University, and MBA and PhD in Management Information Systems from Kyung Hee University. His research interests include e-business strategies, e-commerce, data mining, customer relationship management and multigroup structural equation modelling (MSEM). He has published papers which have appeared in *Cyber Psychology, Behavior, and Social Networking*, *Total Quality Management & Business Excellence*, *Expert Systems with Applications*, *Journal of MIS Research*, *Korean Management Review*, *Journal of the Korea Society for Quality Management*, *Information Systems Review*, etc. Sang-Chul Lee is the corresponding author and can be contacted at: leecho@kcu.ac.kr

www.manaraa.com