Investigating the Mediating Role of Perceived Playfulness in the Acceptance of Hedonic Information Systems

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Abstract: - With the proliferation of hedonic information systems, understanding users’ acceptance of hedonic information systems has become a new topic for practitioners and academics. While perceived playfulness or perceived enjoyment has been found to have a significant influence on the behavioral intention to use hedonic information systems, little research has been conducted to investigate empirically the antecedents of perceived playfulness and the mediating role that perceived playfulness has in user acceptance of hedonic information systems. Thus, the main purpose of this study is to explore the mediating role of perceived playfulness in the psychological process of user acceptance of hedonic online game systems. Based on previous literature, two individual difference variables (i.e., computer self-efficacy and computer anxiety) and three system characteristics variables (i.e., challenge, feedback, and speed) were proposed as potential antecedents of perceived playfulness in the context of massive multiplayer online games. The results indicate that perceived playfulness plays a partial mediating role in the relationship of system characteristics and individual differences to behavioral intention. Both challenge and computer self-efficacy were found to have a significant influence on behavioral intention via perceived playfulness, with computer self-efficacy also having a direct influence on behavioral intention. Computer anxiety, however, was only found to have a direct influence on behavioral intention. Also, neither feedback nor speed was found to have a significant effect on perceived playfulness. The results of this study provide several important implications for research and practices of hedonic information systems/online game design and promotion.

Key-Words: - Hedonic information systems; online game; perceived playfulness; system characteristics; individual differences

1 Introduction

Information systems (IS) research has paid a lot of attention to understanding users’ acceptance of IS. Most of these research attempts and the development of most models explaining IT acceptance focus on the utilitarian aspect of information system usage [7][13]. With the proliferation of Internet applications, hedonic information systems, such as online games, are becoming more and more popular among young people. Understanding user acceptance
of hedonic systems has become a new topic in the field of information systems [9][24]. Drawing a parallel to consumer behavior literature, van der Heijden [24] proposed that the information systems could be classified as either utilitarian or hedonic. Utilitarian systems provide value external to the interaction between user and system (e.g., improved performance). In contrast, hedonic information systems aim to provide self-fulfilling rather than instrumental value to the user, are strongly connected to home and leisure activities, focus on the fun-aspect of using information systems, and encourage prolonged rather than productive use [24].

One of the most-used hedonic systems is massive multiplayer online game (MMOG). An MMOG is a computer game which is capable of supporting hundreds or thousands of players simultaneously, and is played on the Internet [30]. There has been an explosive growth of MMOG players over the past few years. Statistics indicate that Internet users visit game-playing sites more often and stay longer than for any other Internet sites [10]; thus playing MMOGs has become one of the most popular entertainment activities on the Internet. In general, players like MMOGs because these offer the illusion of transcending space and time. Players can play any roles they like in a virtual reality scenario and interact with other players. Since MMOGs allow players to play together without seeing or knowing each other in the context of the Internet, they may satisfy various human desires that players cannot pursue in the real world. Communicating through online games may provide people with opportunities to experience new forms of social contacts without any real social presence [18]. Therefore, the online game world is regarded not only as a temporary medium for playing games but also as a social place where new sorts of human relations are formed [2].

One of the most popular MMOGs is massive multiplayer online role-playing game (MMORPG). An MMORPG is an online computer role-playing game (RPG) in which a large number of players interact with one another in a virtual world. MMORPGs are distinguished from single-player or small multi-player RPGs by the game’s persistent world, usually hosted by the game’s publisher, which continues to exist and evolve while the player is away from the game [29]. Given that the system characteristics may differ for various types of online games and that most of the online game players in Taiwan play MMORPGs, this study focuses on the context of MMORPGs. That is, hedonic systems/massive multiplayer online games in this study refers to MMORPGs. According to Wikipedia [29], the common features of MMORPGs include:

1. traditional Dungeons & Dragons style gameplay, including quests, monsters, and loot;
2. a system for character development, usually involving levels and experience points;
3. an economy, based on the trading of items (such as weapons and armor) and a regular currency;
4. guilds or clans, which are organizations of players, whether or not the game actively supports them; and
5. game moderators (or game master), sometimes paid individuals in charge of supervising the world.

Several behavioral models/theories for explaining the adoption and usage of information technology have been proposed in the IS literature, such as the Theory of Reasoned Action [11], Theory of Planned Behavior [1], Technology Acceptance Model [7][8], and Unified Theory of Acceptance and Use of Technology [26]. Much of the research has investigated the determinants of IT acceptance by applying, extending, comparing, or integrating these behavioral models/theories [20][22]. Most previous IT acceptance models, however, have been tested in a workplace context; thus, hedonic contexts may differ. A hedonic factor may be an important addition to IT acceptance models. Many researchers have suggested that perceived playfulness or perceived enjoyment has a significant influence on the behavioral intention to use hedonic systems, such as WWW, hedonic mobile technology, and online game systems [4][9][21][24]. Little research, however, has been conducted to investigate empirically the antecedents of perceived playfulness and the mediating role that perceived playfulness has in user acceptance of MMOGs.

The main purpose of this study is therefore to understand the antecedents of perceived playfulness and explore how they influence behavioral intention through the mediation of perceived playfulness in the context of massive multiplayer online role-playing games. The remainder of this paper is organized as follows. In the next two sections, we first discuss the conceptualization and theoretical antecedents of perceived playfulness, and then propose the research model and hypotheses based on previous literature. This is followed by descriptions of construct measures and data collection methods used in this study. We then present the results of data analysis and the tests of our hypotheses. Finally, managerial implications and directions for future research are discussed. This empirical study will be useful to researchers in developing and testing theories relating to the acceptance of MMOG, as well as to practitioners in understanding the strategies for designing and promoting massive multiplayer online role-playing games.
2 Research Model and Hypotheses
Based on the TRA or TPB, this study focuses on explicating how specific external variables influence behavioral intention through perceived playfulness in the context of MMOGs. Previous research has identified two main categories of external variables of beliefs about using IT: individual differences and system characteristics. Our proposed research model also includes these two categories of external antecedent variables of perceived playfulness (see Figure 1). In this study, we examine two individual difference variables (i.e., computer self-efficacy and computer anxiety) since individual difference variables related to computer skills have been found to be important antecedents of beliefs about using IT in the information systems literature [4][25][27]. On the other hand, according to the characteristics of MMOGs and the findings of prior studies, we present three system characteristics (i.e., challenge, feedback, and speed) as critical external antecedents of perceived playfulness. The hypotheses proposed by this study are shown below.

Figure 1: Research Model

- **H1**: Perceived playfulness has a positive effect on the behavioral intention to play MMOGs.
- **H2**: Challenge has a positive effect on the perceived playfulness of MMOGs.
- **H3**: Feedback has a positive effect on the perceived playfulness of MMOGs.
- **H4**: Speed has a positive effect on the perceived playfulness of MMOGs.
- **H5**: Computer self-efficacy has a positive effect on the perceived playfulness of MMOGs.
- **H6**: Computer self-efficacy has a positive effect on the behavioral intention to play MMOGs.
- **H7**: Computer anxiety has a negative effect on the perceived playfulness of MMOGs.
- **H8**: Computer anxiety has a negative effect on the behavioral intention to play MMOGs.

3 Research Methodology

3.1 Subjects
To make the results generalizable, we gathered sample data from five organizations in Taiwan. Respondents were first asked whether they had ever played MMORPGs; if they replied in the affirmative, they were asked to participate in the survey. The respondents were instructed to answer the questions based on their prior experience of playing MMORPGs. This served to relate the survey respondents to a class of MMOGs, i.e., MMORPG. For each question, respondents were asked to circle the response that best described their degree of agreement. A sample of 279 usable responses was obtained from a variety of respondents with different backgrounds. A total of 55.2% of the respondents were male. The respondents had an average of 9.37 years of computer experience (S.D. = 5.67) and 5.64 years of Internet experience (S.D. = 3.03). Also, 35.5% of respondents had a degree at the college level or above.

3.2 Measures
To ensure the content validity of the scales, the items selected must represent the concept about which generalizations are to be made. Therefore, measuring instruments or items adapted from prior studies were used to measure computer self-efficacy, computer anxiety, speed, feedback, challenge, perceived playfulness, and behavioral intention. Five items adapted from Webster and Martocchio [28] and Moon and Kim [21] were used to measure perceived playfulness. Four items for the computer self-efficacy construct were adapted from the original instrument of computer self-efficacy developed by Compeau and Higgins [5]. The items used to measure computer anxiety were adapted from Heinssen et al.’s [14] computer anxiety rating scale. Three items selected from Venkatesh et al. [26] were used to measure behavioral intention. Finally, the items for the speed, feedback, and challenge constructs were developed based on Chung and Tan’s [4] exploratory work. Pre-testing of the measures was conducted by users selected from the MMOG field and experts in the area of IS research. Accordingly, the items were further adjusted to make their wording as precise as possible. Likert scales (1-7), with anchors ranging from “strongly disagree” to “strongly agree,” were used for all construct items. The questionnaire also contains demographic questions.

4 Results
A structural equation model using AMOS 4.0 was conducted to test the research model. Comparison of
all fit indices with their corresponding recommended values provided evidence of a good model fit ($\chi^2/df = 1.577$, GFI = 0.908, AGFI = 0.877, NFI = 0.959, CFI = 0.985, and RMSR = 0.084). Thus, we were able to proceed to examine the path coefficients of the structural model.

Properties of the causal paths, including standardized path coefficients and significance levels, are shown in Figure 2. The effect of perceived playfulness on behavioral intention was highly significant ($\beta=0.376$, P<0.001); thus, H1 was supported. As expected, computer self-efficacy had significant positive influences on perceived playfulness ($\gamma=0.155$, P<0.05) and behavioral intention ($\gamma=0.293$, P<0.001); therefore, H5 and H6 were also supported. Computer anxiety had a negative impact on behavioral intention ($\gamma=-0.169$, P<0.01); and challenge was found to be significant in determining perceived playfulness ($\gamma=0.376$, P<0.001); thus, H2 and H8 were supported. Speed, feedback, and computer anxiety, however, had no significant influence on perceived playfulness; thus, H3, H4, and H7 were rejected. Altogether, the proposed model accounted for 40 percent of the variance in behavioral intention and 23 percent of the variance in perceived playfulness.

5 Discussion
This study explored the antecedents of perceived playfulness and examined how they influence behavioral intention to play MMOGs through the mediation of perceived playfulness. Based on the TRA’s framework and prior studies, two main categories of external antecedents of perceived playfulness were proposed and tested: individual differences and system characteristics. We proposed two individual difference variables (i.e., computer self-efficacy and computer anxiety) and three system characteristics variables (i.e., challenge, feedback, and speed) as potential antecedents of perceived playfulness.

As expected, perceived playfulness was found to be a significant determinant of behavioral intention in the context of MMOGs. That is, users who have higher levels of perceived playfulness toward MMOGs will develop a higher level of behavioral intention to play MMOGs. This finding supports prior studies that have found a significant direct relationship between the perceived-playfulness-related constructs and behavioral intention to use hedonic information systems [9][21][24]. The result also implies that online game practitioners could increase usage intention by promoting users’ perceived playfulness of online games.

Since it is important to pay attention to the system characteristics factors that contribute to perceived playfulness when designing MMOGs, the study investigated three system characteristics: challenge, speed, and feedback. Of the three, only challenge was found to be a salient antecedent of perceived playfulness. The results indicate that challenge has a direct influence on perceived playfulness and an indirect influence on behavioral intention through perceived playfulness. Perceived playfulness plays an important mediating role in the effect of challenge on behavioral intention. The positive challenge of an MMOG can provide players with unexpected difficulties and attractive journeys. Thus, challenges can inspire players’ perception of playfulness toward MMOGs and indirectly influence their intention to play such games. The results also indicate that if the MMOGs offer the game player such challenges that are in correspondence with his or her playing skills, the extent of experiencing playfulness is higher. This study confirms previous researchers’ argument that an individual likes to encounter challenges and experiences the greatest perceived playfulness when challenges and playing skills are matched [6][17][31]. As Kiili [17] noted, a player’s prior experiences and skills will affect how the player perceives the playfulness of an MMOG. If the challenge is significantly lower than player’s skill level, the player may feel bored. In contrast, if the challenge is significantly greater than the game player’s skill level, he or she may become frustrated. In order to increase perceived playfulness, an MMOG should provide a player with challenges that are closely matched to his or her skill level of playing. Thus, the critical task of MMoG design is to sustain the motivation and engagement of the player by offering appropriate challenges to him or her. The challenges rendered by an MMOG should be balanced so that the game’s difficulty increases incrementally and do not vary irregularly. If the
challenge level decreases before the game is completed, a player may lose interest in the game. To keep a player in a playful state, game designers should ensure that when a player’s level of playing skill increases the challenges become more difficult. On the other hand, the online game publisher can provide some guidance to the player or provide the possibility of solving problems with the help of other players (Kiili, 2005).

Interestingly, however, neither speed nor feedback has a significant effect on perceived playfulness. While speed may be an important system characteristic for a specific class of online games (e.g., action games), it was not a salient antecedent of perceived playfulness for massive multiplayer online role-playing games as a whole. On the other hand, feedback may be considered as a required system characteristic for all kinds of online games, thus making it have a non-significant effect on perceived playfulness. Our findings also suggest that system characteristics may have different influences on perceived playfulness for different types of online games. Therefore, future research should individually examine the effects of specific system characteristics on perceived playfulness in various contexts of online games.

This study also examined the role that perceived playfulness has in the effects of computer self-efficacy and computer anxiety on behavioral intention. This was to investigate how computer self-efficacy and computer anxiety influence behavioral intention directly or indirectly through the mediation of perceived playfulness. The results indicate that computer self-efficacy can influence behavioral intention directly or indirectly through perceived playfulness. Computer anxiety, however, was found to have only a direct influence on behavioral intention. Hence, perceived playfulness only partially mediates the influences of computer self-efficacy and computer anxiety on behavioral intention in the context of MMOGs. The findings also provide some important implications for online game management. Given that the use of online games is completely voluntary and that the target user group consists of a number of people with diversified backgrounds, the findings of this study suggest that in order to attract more users to play online games, management attention could be focused on increasing users’ perception of playfulness and behavioral intention by increasing their computer skills. For example, online game managers can provide free computer/online game seminars or training courses for potential players to increase their computer self-efficacy and decrease their computer anxiety. When users have higher computer self-efficacy, they will have higher levels of perceived playfulness and develop higher levels of behavioral intention to play online games.

6 Conclusion
Past research on the acceptance of Internet-based systems/hedonic systems focuses mainly on the determinants of behavioral intention [3][12][16][19][21][23][27]. The current study, however, focuses on investigating the antecedents of perceived playfulness and the mediating role that perceived playfulness has in the acceptance of MMOGs. While only confirming the partial mediating roles of perceived playfulness, this study is the pioneering empirical effort to examine the external antecedents of perceived playfulness in the context of hedonic systems/online games. Hence, the results represent an important step forward in unraveling the intricate relationship between system characteristics, individual differences, perceived playfulness, and behavioral intention to use hedonic information systems. The contributions of this study to hedonic systems/online game acceptance research are fourfold. First, this study successfully applied the TRA’s framework to explore how system characteristics and individual differences influence behavioral intention via the intervening perceived playfulness construct. Second, perceived playfulness was found to play a partial mediating role in the relationship of system characteristics and individual differences to behavioral intention. Third, both challenge and computer self-efficacy were found to have significant influences on behavioral intention via perceived playfulness, with computer self-efficacy also having a direct influence on behavioral intention. Finally, computer anxiety was found to have only a direct influence on behavioral intention. Also, neither feedback nor speed was found to have a significant effect on perceived playfulness. The results of this study provide several implications for research and practices of hedonic systems/online game design and promotion.

References:


