

THE INTENTION TO PLAY ONLINE MOBILE GAMES IN HO CHI MINH CITY, VIETNAM

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Abstract: *The mobile game industry in Asia has been rapidly developed and is on its way to become the main sector in the mobile service industry thanks to the significantly fast growth of internet and mobile devices. However, most researches still focus on how to create fascinating computer or video games. Therefore, this study aims to examine the factors affecting gamers' intention to play in Vietnam. It proposes a research model based on both technological and psychological factors. Data collection was done through quantitative surveys and then, 410 valid responses were used for Partial Least Square – Structural Equation Modeling (PLS-SEM) analysis. The results have shown that the most important drivers of gamers' intention to play online mobile games is perceived enjoyment, followed by satisfaction about games, which in turn is predicted by perceived co-presence and perceived enjoyment. Moreover, among the three technological factors, communication characteristics affect both types of gamers' perception; however, the strongest impact belongs to attractive characteristics, which significantly influence perceived enjoyment. In contrast, it was proven that image characteristics and attractive characteristics do not have significant impact on perceived enjoyment and perceived co-presence, respectively. Overall findings of this study provide some suggestions to mobile game companies as well as independent game producers in conducting appropriate strategies to create interesting and entertaining online mobile games with suitable features to make players feel more enjoyable and willing to stick with the games.*

Keywords: *Online mobile games, PLS, Co-presence, Enjoyment, Satisfaction, Intention to play.*

1. INTRODUCTION

The entertainment industry has been one of the main sectors of the service industry in recent years, in which the game industry is considered to be the key portion in the development of entertainment industry. As stated in a report from AppLift, a mobile game marketing firm, and Newzoo, a market research company, mobile game revenue is expected to double from \$17.5 billion in 2013 to \$35.4 billion by 2017 in the global market. Meanwhile, another report of Newzoo showed a huge gamer population in the world with about 1.747 billion in 2013, including 1.2 billion people playing games on their mobile devices. Sharp and Rowe (2006) considered the mobile game as growing service industry thanks to its convenience, mobility

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and has many possibilities for entertainment companies to gain profits. DFC Intelligence announces that this game industry is predicted to reach the \$100 billion in just a few years. Furthermore, recent modern technological development such as mobile devices with wireless connection has brought many opportunities for participants (e.g. game producers, game marketers, communication service providers, terminal manufacturers) in entertainment industry to expand their business and earn higher profits.

In the context of Vietnam, Mwork, a mobile affiliate network company, announced that the mobile game market's scale in 2014 was nearly equal to the Personal Computer (PC) game market with the value of \$210 million, which was 3.5 times higher than in 2012. Moreover, Vietnam is believed to be one of the biggest game markets in Southeast Asia in the near future thanks to its strong technology development and the popularization of smartphones. One of the most important milestones to illustrate this statement is the great success of Flappy Bird, a Vietnamese mobile game written by Nguyen Ha Dong, in the world market in early 2014. Flappy Bird has awakened the domestic game development community and more importantly has proven that the mobile game market has a significantly high potential, in which programmers may have many chances to design such kind of mobile game like what Nguyen Ha Dong did with Flappy Bird. After this event, a new trend has happened that many programmers, who specialize in developing PC game, have switched their interest to the mobile game market.

Although there has been a huge number of studies on computer games (Benford *et al.*, 2005 and MacInnes *et al.*, 2002), most of it has focused on online games (Brun *et al.*, 2006; Claypool & Claypool, 2006; Huang & Cappel, 2005; Peña & Hancock, 2006; Sinha *et al.*, 2005), but less attention has been given to the games with mobile version. Therefore, this study aims to investigate what factors actually affecting people's satisfaction about games and intention to play online mobile games in Ho Chi Minh City. By developing an analysis on the characteristics of mobile games as well as gamers' perceptions, the study could benefit game companies and independent game producers. It is expected that based on this study, some appropriate suggestions can be made to help Vietnamese mobile game industry.

The empirical results in this study demonstrate that all independent variables, in general, have an influence on their corresponding dependent constructs. Among three technological related factors, attractive characteristics have the strongest impact on its latent construct (i.e. perceived enjoyment), while the two other factors somewhat contribute to predict players' psychological perception about games. Besides, perceived co-presence and perceived enjoyment were proven to contribute to satisfaction about games and the intention to play games, in which perceived enjoyment played the most vital role in player's decision to continue to play online mobile games in the future. Lastly, satisfaction about games also has a linkage with intention to play games.

The remainder of this paper is organized as follows: Section 2 is the discussion of previous literature, which focused on technological layer of mobile games, players' perception and their intention to play games. After that a research model with hypotheses was developed. Section 3 describes the research methodology, followed by the data analysis, which is mentioned in Section 4. Section 5 provides the discussion of findings. Finally, section 6 follows the conclusion and practical implications for participants in the mobile game industry.

2. LITERATURE REVIEW

Research on computer games has been paid attention for many years. In general, many studies about computer games and online games have been conducted with the main concerns in technological and psychological aspects (Choi & Kim, 2004; C.-S. Kim *et al.*, 2010; E. Park *et al.*, 2014; Rhyne, 2002; Teng, 2010). First, in technological aspect, research mainly focuses on the visual and physical appearance of the games as well as what function they can bring to the gamers such as visualization designed, sound, scenario (Calvillo-Gómez *et al.*, 2010 and Rhyne, 2002), goals and operators of gameplay (Choi & Kim, 2004), inter-user communication, game speed (Sinha *et al.*, 2005; Wang & Wang, 2008), and the challenges or applications provided (Sharp & Rowe, 2006; Teng, 2013). Those factors are investigated to serve the main objectives of finding ways in making computer games, especially the action ones, become more realistic and fantastic, and giving some suggestions to increase gamers' loyalty to games.

Secondly, the psychological aspect in computer games is studied with some factors similar to those in research of purchase intention or customer retention. Specifically, in the study of Shin and Shin (2011), perceived playfulness, perceived usefulness, perceived enjoyment, and perceived securities were explored to find out why people want to play social network games. In addition to gamers' perception of pleasure in playing video or online games, sense of community may also contribute to their intention to play games as well. It is defined as the ability to talk or share information and opinions among gamers when playing together (Preece *et al.*, 1994). C.-S. Kim *et al.*, (2010) noticed that sense of community can be considered as co-presence, which is the feeling of connection among people in virtual environment; hence, it is a suitable factor in the context of multi-player video games.

Based on the research in computer games, this study, in the context of online mobile games, aims to combine technological and psychological factors to investigate the effect of game characteristics on gamers' perception and intention to play games. Particularly, image, communication, and attractive characteristics are presented for technological layer to test whether or not they impact on perceived co-presence and perceived enjoyment, which in turn may have an influence on gamers' satisfaction and intention to play online mobile games.

2.1. Research variables and hypothesis

2.1.1. *Image Characteristics and its Dimensions*

“Image characteristics” is a term that describes the fantasy of the game display. When creating an appeal action game to players, it should be noticed that good design can make the games more exciting (Rhyne, 2002). For example, natural characters make players feel realistic because they think its style is similar to them (Csikszentmihalyi&Csikszentmihalyi, 1991 and Hwa Hsu et al., 2005). On the other hand, color, shape, or font of the screen may also be focused when discussing about images of mobile games (Cyr *et al.*, 2006). Furthermore, the game background story or scenario should be varied, surprised, and related with the game graphics in order to serve the purpose of entertainment for gamers, as argued by Calvillo-Gómez *et al.* (2010) and Hwa Hsu *et al.* (2005). Hence, based on the previous literature, two factors are selected as the dimensions of image characteristics: (1) game graphics and (2) game scenario. Wonderful image characteristics may help players increase their feelings of connection to other players during their gameplay because it can provide higher levels of immersing to the game environment (Rice, 1992). Thus, image characteristics may positively impact players’ perceived co-presence. Moreover, players may become more enjoyable when playing games with better images (Rhyne, 2002). Hence, two hypotheses are proposed as follows:

H1: There is a positive impact of image characteristics on the players’ perceived co-presence of online mobile games.

H2: There is a positive impact of image characteristics on the players’ perceived enjoyment of online mobile games.

2.1.2. *Communication Characteristics and its Dimensions*

Some factors such as speed or sound may need an attention when mentioning mobile games’ ability to communicate with players. In the study of consumers’ attitudes toward e-shopping, Liao and Cheung (2001) emphasized the role of network speed and stability because they are the two critical factors in measuring the system quality. Similarly, in the context of computer games, Chung and Tan (2004) considered game speed as the players’ perception of how fast the game system responses to their input. However, as Wang and Wang (2008) stated, online games need not only a fast computer system but also a reliable server in order to handle various connections at the same time and meet the demand for the interaction among players. Besides, they want to make more new friends through online games, so game speed and live interaction may contribute much to their playfulness and enjoyment. Gärdenfors (2003) illustrated game sound received high estimation as a result of proper background music and sound effect. Namely, the author suggested that designers should focus on how to make game sound fits the game events as well as being arranged properly. A game with

high sound quality may motivate players to spend more time with that game, leading to the increase in game enjoyment. Communication characteristics are considered as a positive impact on perceived enjoyment and perceived co-presence since they enable players to enjoy an interesting game environment while raising the extent to which players will gain a better sense of communication or perceived co-presence (C.-S. Kim *et al.*, 2010). Therefore, the two corresponding hypotheses are:

H3: There is a positive impact of communication characteristics on the players' perceived co-presence of online mobile games.

H4: There is a positive impact of communication characteristics on the players' perceived enjoyment of online mobile games.

2.1.3. Attractive Characteristics and its Dimensions

Clanton (1998) and Crawford (1984) argued that game-playing and problem-solving processes are similar to each other because game missions are what players need to complete using suitable strategies and information. Previous research in the context of online computer and video games has shown that goal settings, game options, and rewards should be provided for players in order to bring fun and entertainment to the games (Federoff, 2002; Korhonen & Koivisto, 2006; Sweetser & Wyeth, 2005; Teng, 2010).

Choi and Kim (2004) defined that goal is what players exactly want to achieve during their gameplay; thus, they need to be provided with as much as possible information from the game in order to reach these goals (C.-S. Kim *et al.*, 2010). Such hints, as argued by Clanton (1998), may not just play a role in helping players in their goal seeking process, but also making them feel good about this game, which in turn, motivates them to continue to play it. Furthermore, players should be provided freedom to control their performance effectively through game options, otherwise their interaction may be restricted (Sweetser & Wyeth, 2005). Particularly, players should conveniently decide their characters' actions, feel like they are in control of every situation in the game by being allowed to create, select, change, or customize characters or items of the game (Sweetser & Wyeth, 2005; Teng, 2010). As stated by Baumgartner *et al.* (2006), Bailey *et al.* (2009), and Teng (2010), game options can lead to the increase of co-presence among gamers and make online gaming become more enjoyable. Obviously, previous research has shown that attractive characteristics may have a positive impact on perceived enjoyment as well as perceived co-presence as they provide players a game environment with high levels of personalization and interaction. Therefore, the two hypotheses are developed as follows:

H5: There is a positive impact of attractive characteristics on the players' perceived co-presence of online mobile games.

H6: There is a positive impact of attractive characteristics on the players' perceived enjoyment of online mobile games.

2.1.4. Perceived co-presence, perceived enjoyment and their impact on satisfaction about games and intention to play games

2.1.4.1 Perceived co-presence and perceived enjoyment: Agarwal and Karahanna (2000) and Venkatesh (2000) defined enjoyment as the entertainment that players receive through activities offered by a product or service. In the context of social network games, perceived enjoyment, as stated by Sweetser and Wyeth (2005) and Shin and Shin (2011), is considered as an important factor because this type of game offers many entertaining contents and playful services. Besides, Yoon *et al.* (2013) noted that people could take most advantages from technology thanks to both extrinsic (i.e. rewards) and intrinsic motivations (i.e. enjoyment), in which the latter may play a very significant role in the context of online games, especially during gamers' decision making (Hartman *et al.*, 2006).

On the other hand, perceived co-presence can be regarded as the extent to which a person feels that he/she is connecting with other people and in the opposite way, this person's partners also perceive the interaction with him/her (Goffman, 2008; Nowak, 2001). Zhao (2003) has developed the taxonomy of co-presence to conduct four types of human interaction based on their proximity and corporeality: corporeal co-presence, corporeal tele-co-presence, virtual co-presence, and virtual tele-co-presence, in which the first two forms can best describe the sense of co-presence. Goffman (2008) stated that human togetherness is enhanced not just only by one's perceptions of embodiment and his feelings of immediacy with other people (i.e. corporeal tele-co-presence), but by their physical contact in real life (i.e. corporeal co-presence). Thus, the term co-presence in this study focuses on how players can connect with one another in both virtual and real worlds through playing online mobile games. In a game environment, enhance in gamers' interest and enjoyment will lead to an increase in their sense of co-presence, as argued by C.-S. Kim *et al.* (2010). Hence, the following hypothesis can be developed:

H7: There is a positive impact of perceived enjoyment on the players' perceived co-presence of online mobile games.

2.1.4.2 Perception variables and satisfaction about games: Biocca *et al.* (2003) argued that psychological connection to other people can be conducted through interacting by avatars and higher sense of co-presence can help contribute to people's satisfaction. Moreover, the findings in the study of Bulu (2012) showed that co-presence may affect people's satisfaction because when a person feel like he has become a part of a group or a community in his interested field, he will be more satisfied. In addition to the contribution of perceived co-presence to satisfaction, perceived enjoyment has been proven to have an influence on satisfaction as well,

especially in mobile services (B.-W. Park & Lee, 2011a; Revels *et al.*, 2010; Tommy *et al.*, 2014). Hence, it is reasonable to suggest that:

- H8:** There is a positive impact of perceived co-presence on the players' satisfaction about online mobile games.
- H9:** There is a positive impact of perceived enjoyment on the players' satisfaction about online mobile games.

2.1.5. Perception Variables and Intention to Play Online Mobile Games

Mathieson (1991) stated that intention to play games is a term used to present a player's willingness to continue to play a game or get involved to other relevant games in the future. Mobile games, especially the online type, which allows players to interact with each other not only during their gameplay but also in daily life, indicates its importance of communicability or co-presence. This factor, in turn, plays a role in keeping gamers stick with the games they are playing (C.-S. Kim *et al.*, 2010). Lee and Chen (2010), with the study of consumer online behavior, suggested that the factor tele-presence might positively affect consumers' intention to purchase. Beside co-presence, many studies have shown that enjoyment is a key motive factor playing online games (Yoon *et al.*, 2013) and there is an increase in people's intention once their enjoyment is heightened or improved, indicating its positive impact on intention (Guo & Barnes, 2011; Lin *et al.*, 2012; Nysveen *et al.*, 2005; Shin & Shin, 2011; and Yoon *et al.*, 2013). Thus, this study suggests the two following hypotheses:

- H10:** There is a positive impact of perceived co-presence on the players' intention to play online mobile games.
- H11:** There is a positive impact of perceived enjoyment on the players' intention to play online mobile games.

2.1.6. Satisfaction about Games and its Impact on the Intention to Play Games

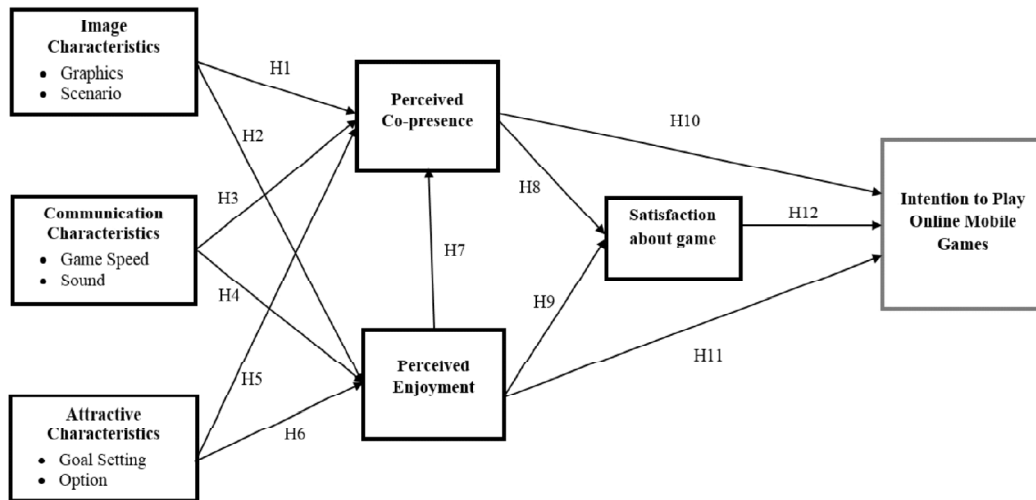
Customer satisfaction is usually a critical consideration when any marketing company analyzes the market because it may affect customer's purchase intentions (Homburg & Rudolph, 2001). In the context of online games, satisfied customers tend to have a demand of continuing to enjoy the games (B.-W. Park & Lee, 2011b). Like enjoyment, satisfaction about a specific good or service has been widely proven to have a positive impact on the intention of users to use this good or service (C.-C. Chang, 2013; Y. P. Chang & Zhu, 2012; B.-W. Park & Lee, 2011b; E. Park *et al.*, 2014; Revels *et al.*, 2010; Yeh *et al.*, 2013; Zhou, 2013). Therefore, the following hypothesis is proposed:

- H12:** There is a positive impact of satisfaction about games on the players' intention to play online mobile games.

2.2. Research Model

The research model of this study is mainly adapted from C.-S. Kim *et al.* (2010). Furthermore, “Satisfaction about Games”, adapted from Bulu (2012) and Revels *et al.* (2010), is added to analyze the relationship between this factor and the related endogenous variables.

Figure 1: Proposed Research Model



3. METHODOLOGY

3.1. Questionnaire Development

The survey was conducted via both online and offline forms to examine the above hypotheses. The items for each construct were adapted from various prior papers with some modifications for an online mobile game context. The initial translations of the survey questions were tested by six gamers who have spent at least three years experiencing mobile games. Based on their comments, some ambiguous question items were replaced by more clarified and suitable ones, and some more question items were also added based on other related research papers. Nonetheless, in order to ensure the appropriateness of the questionnaires before conducting the official survey, a pilot test on 32 players was carried out. Those respondents were asked to fill in the question form as well as write comments about their difficulty understanding the question items. After the revision, 46 items were used for the survey. The respondents indicated their agreement about image characteristics, communication characteristics, attractive characteristics, perceived co-presence, perceive enjoyment, satisfaction, and intention to play mobile games by following the 5-point Likert Scale ranging from 1-Strongly Disagree to 5-Strongly Agree.

3.4. Sampling Selection and Data Collection

The present study limits the survey respondents within Ho Chi Minh City. The survey was conducted from November 18 to December 5 in 2014. People who used to or are playing any kind of online mobile games can totally participate in the survey. All the participants were informed about the purposes of this study and assured that their responses would be kept confidentially and just used for research purpose only. Then, those subjects were asked for their willingness to answer the questionnaires. Among approximately 500 responses collected, a total of 410 valid ones were used. Some demographic features of them are summarized on Table 1.

3.5. Item Measurement

The research model includes ten variables, each of which was measured by various indicators adapted from some previous studies for the content validity. Firstly, image characteristics of online mobile games included two dimensions: (1) graphic and (2) scenario, in which the former was made up of five items based on previous works by Calvillo-Gómez *et al.* (2010); C.-S. Kim *et al.* (2010), and Lin *et al.* (2012), while the latter consisted of three items and was measured by the previous study of C.-S. Kim *et al.* (2010). Secondly, communication characteristics were reflected by game speed and sound, in which five items measuring game speed have been included in two pieces of literature written by C.-S. Kim *et al.* (2010) and Wang and Wang (2008), while the four items of game sound were based on the study of Hwa Hsu *et al.* (2005). The third technological layer of this study, which is attractive characteristics, was comprised of goal setting and game options. Each of them included three and four items adapted from Choi and Kim (2004) and Teng (2010), respectively.

With perceived co-presence, four measurements from C.-S. Kim *et al.* (2010) and Takatalo *et al.* (2010) were chosen, while perceived enjoyment was the modification of six items taken from various pieces of literature by Bowman *et al.* (2013); C.-S. Kim *et al.* (2010); and Pe-Than *et al.* (2014). To address the elements of satisfaction about games, 6-item scale is developed on the basis of items used in different studies by Lu and Wang (2008); B.-W. Park and Lee (2011b); E. Park *et al.* (2014). Finally, the intention to play mobile games is measured using five items that were similar to the items used by C. Kim *et al.* (2010) and Yoon *et al.* (2013). The details of all the constructs as well as their measurements are presented in the Appendix.

3.6. Data Analysis Instrument

Firstly, the descriptive statistics was used to analyze the demographic data. Then, the research model and hypothesized relationships were tested by partial least

square structural equation modeling (PLS-SEM) in SmartPLS 2.0 M3, which is developed by Ringle *et al.* (2005). PLS is an excellent choice for SEM analysis when the research model is considered as complex with many constructs and indicators and few literatures have been established (Peng & Lai, 2012). Furthermore, PLS has become an emerging tool in modern research in mobile and entertainment services (Guo & Barnes, 2011; Lee & Chen, 2010; Lin *et al.*, 2012; B.-W. Park & Lee, 2011a; Tommy *et al.*, 2014).

4. DATA ANALYSIS

4.1. Sample Demographics

Table 1
Demographic Analysis

		<i>Frequency</i>	<i>Percentage (%)</i>
Gender	Male	168	41.0
	Female	242	59.0
Age	Under 20	226	55.1
	21-30	159	38.8
	Over 30	25	6.1
Education	High school	142	34.6
	College or University	245	59.8
	Graduated or above	23	5.6
Number of games played per month	Less than 3	280	68.3
	3-5	98	23.9
	More than 5	32	7.8
Period of playing time	Under 1 year	136	33.2
	1-2 years	129	31.5
	2-3 years	65	15.9
	Over 3 years	80	19.5
The most favorite game type	Building	38	9.3
	Battle	42	10.2
	Shooting	21	5.1
	Sports	39	9.5
	Adventures	46	11.2
	Role	53	12.9
	Management	109	26.6
	Other	62	15.1
	Total	410	100.0

Among 410 valid responses collected from the survey, 41% of them were male and 59% were female. With regard to age, over 50% of respondents are under 20 years old. Besides, with regard to education, approximately 95% of them are high school and college students. Over half of participants stated that they played less than three games per month. In contrast, not many players play more than five

games per month, but all respondents have some certain experiences with online mobile games.

4.3. Main Survey Results

4.3.1. Convergent Validity and Reliability

The convergent validity was examined using the composite reliability (CR) and the average variance extracted (AVE). Basically, Hair et al. (2013) suggested a construct, regardless of its order, will meet the requirement of convergent validity when its outer loading is greater than 0.7 and AVE greater than the cut-off value of 0.5. Moreover, Bagozzi and Yi (1988), Götzt et al. (2010), and Nunally and Bernstein (1994) suggested that the value of the composite reliability is considered to be preferable when it reach at least 0.7 and acceptable when it is greater than 0.6. After dropping items with loadings lower than the critical values, all constructs and indicators were satisfactory, as summarized in table 2 below.

Table 2
Assessment of Reliability and Convergent Validity

<i>Constructs</i>	<i>Range of standardized loadings</i>	<i>Composite Reliability</i>	<i>AVE</i>
Image Characteristics	0.783 - 0.922	0.8342	0.5049
Graphics (GRA)	0.7801 - 0.8768	0.8636	0.679
Scenario (SCE)	0.7606 - 0.8474	0.7861	0.6483
Communication Characteristics	0.757 - 0.882	0.8358	0.5059
Speed (SPE)	0.9024 - 0.909	0.9013	0.8203
Sound (SOU)	0.7567 - 0.8905	0.8643	0.6807
Attractive Characteristics	0.743 - 0.883	0.8362	0.506
Goal Setting (GS)	0.8914 - 0.9036	0.8923	0.8056
Game Option (GO)	0.8085 - 0.872	0.8757	0.7015
Perceived Co-presence (PCP)	0.8229 - 0.8572	0.8748	0.6997
Perceived Enjoyment (PE)	0.701 - 0.811	0.8478	0.5827
Satisfaction about games (SAT)	0.8072 - 0.890	0.8893	0.7284
Intention to play games (INT)	0.7386 - 0.8521	0.858	0.6025

4.3.2. Discriminant Validity

Discriminant validity can be tested based on the Fornell and Larcker (1981) criterion using the square root of AVE and the correlations between the latent variables, in which the square root of AVE for each construct should be higher than the highest correlation with any other construct. Therefore, we developed a matrix of correlations with the replacement of the matrix diagonal by the square root of corresponding AVE values (see Table 3). Obviously, the square root of AVE for each construct was higher than the elements of the diagonal. In brief, the results

on Table 3 indicate a strong empirical evidence for the reliability and validity of the constructs in this present study

Table 3
Correlations between constructs and square root AVEs

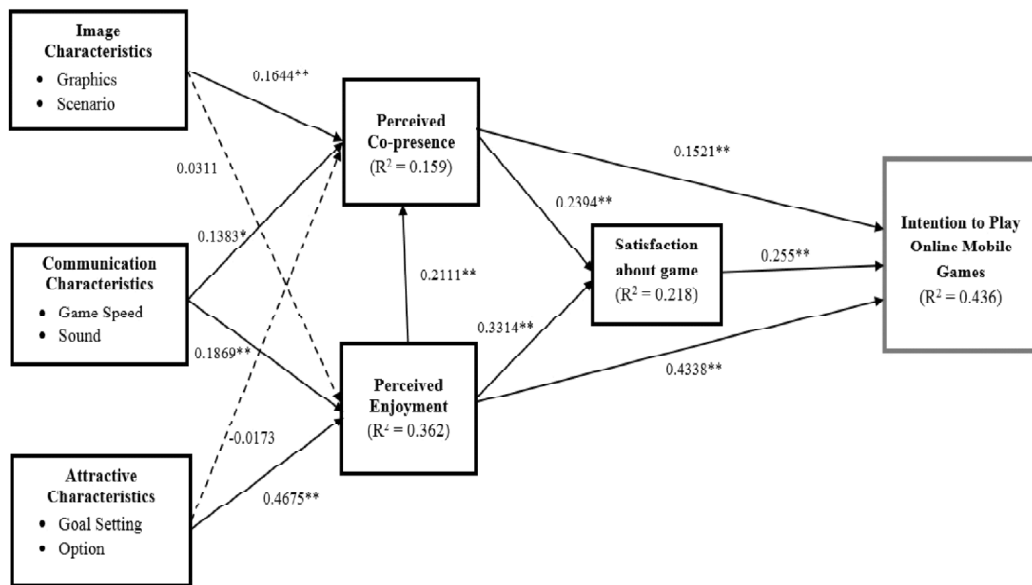
	GO	GRA	GS	INT	PCP	PE	SAT	SCE	SOU	SPE
GO	0.838									
GRA	0.230	0.824								
GS	0.342	0.420	0.898							
INT	0.336	0.202	0.261	0.776						
PCP	0.178	0.270	0.245	0.379	0.836					
PE	0.511	0.267	0.423	0.587	0.320	0.763				
SAT	0.204	0.276	0.252	0.485	0.346	0.408	0.853			
SCE	0.326	0.482	0.439	0.263	0.274	0.380	0.212	0.805		
SOU	0.347	0.417	0.333	0.220	0.331	0.378	0.289	0.418	0.825	
SPE	0.271	0.410	0.439	0.180	0.170	0.342	0.303	0.458	0.361	0.906

Note: The diagonal of the matrix shows the square root AVE for each respecting construct

4.3.3. Structural model evaluation

Firstly, we obtained the coefficient of determination (i.e. R-squared) through the PLS algorithm. The three second-order constructs together explained 15.9% and

Figure 2: Final Research model with Empirical Results



Note: * denotes p<0.05 and ** denotes p<0.01

36.2% of the variance in perceived co-presence and perceived enjoyment, respectively. Meanwhile, the construct for satisfaction had an R-squared value of 0.218 (or 21.8%) and the model explains 43% of the variance in the intention to play online mobile games. In general, the empirical results confirmed that all the independent variables are good predictors to players' intention to play online mobile games. Secondly, we tested the significant level of the path coefficients by using bootstrapping method with 5000 random samples. Overall, as shown in figure 2, there was a support for most of the hypotheses of this study, except for the linkage between attractive characteristics and perceived co-presence and between image characteristics and perceived enjoyment.

5. RESULT DISCUSSION

This study aims to investigate the factors affecting players' satisfaction and intention to play online mobile games. Firstly, the analysis result demonstrated that image characteristics positively influence perceived co-presence. In contrast, the findings indicate that image characteristics did not positively influence perceived enjoyment. This interesting result is opposite to previous results from C.-S. Kim *et al.* (2010) and Lin *et al.* (2012) that show a significant relationship between these two factors. Secondly, communication characteristics showed a significant relationship with both perceived co-presence and perceived enjoyment, corroborating with findings and conclusion in before studies (C.-S. Kim *et al.*, 2010; Shaikh *et al.*, 2006). Thus, in the context of Ho Chi Minh City of Vietnam, game speed and sound, the two dimensions of communication characteristics, might provide a stable and interesting game environment for players, thereby supporting their perception of each other and then increasing enjoyment when multi-playing. Thirdly, attractive characteristics were predicted to have a positive impact on perceived co-presence. However, the empirical results did not support that prediction. In contrast, the impact of this factor on perceived enjoyment was strongly supported, which can be observed in prior studies about video games and action games of Hwa Hsu *et al.* (2005); Preece *et al.* (1994); Sweetser and Wyeth (2005). Thus, it can be seen that regardless of what country and what kind of games, an attractive game with suitable options and appropriate missions and information providing for players can raise their attention to this game.

Furthermore, the findings also indicate that there is a positive impact of perceived enjoyment on perceived co-presence, which is opposite to the finding in the context of offline mobile games in Korea by C.-S. Kim *et al.* (2010). Similarly, the impact of perceived co-presence and perceived enjoyment on satisfaction about games received strong empirical supports. In comparison with prior findings, it can be seen that the impact of perceived co-presence on satisfaction is confirmed by Bulu (2012) but contradicted to Hassell *et al.* (2009), who concluded that there is no relationship between these factors. Besides, many previous studies, no matter

what whether or not it is related to gaming context, have shown that perceived enjoyment is a good predictor of satisfaction (B.-W. Park & Lee, 2011a; Revels *et al.*, 2010; Tommy *et al.*, 2014; Yoon *et al.*, 2013). As expected, this study shares the similar result with those prior studies; therefore, it can be implied that when players feel worthwhile to play an online mobile game and want to play it more, they are satisfied with it. On the other hand, the positive impacts of psychological factors on intention to play online mobile games are also confirmed by many previous research (C.-S. Kim *et al.*, 2010; Leong *et al.*, 2013; Nysveen *et al.*, 2005; Shin & Shin, 2011; Yoon *et al.*, 2013). However, just perceived enjoyment shows a rather strong influence on the dependent variable. Thus, it can be observed that player's enjoyment from a game they are playing is a strong motivation to keep them stick with that game in the future, while the togetherness during a game play is not the main reason for why players want to continue to play that game. Given the significant relationship between satisfaction and intention that were proved in prior studies (B.-W. Park & Lee, 2011a; E. Park *et al.*, 2014; Revels *et al.*, 2010; Yeh *et al.*, 2013), this study also shows a similar result. Thus, the more satisfied players feel when experiencing a game, the more likely they may keep playing this game in the future.

6. CONCLUSION AND IMPLICATIONS

This study contributes to the understanding of what factors affecting the intention to play online mobile games in Ho Chi Minh City based on both technological and psychological layers. Practical implication can be suggested from the findings, which is useful for establishing strategies applied in the mobile industry, particularly for game companies and game producers.

The first suggestion is based on the perceived enjoyment because it has the strongest impact on the player's satisfaction about games and their intention to play online mobile games. Making attractive games that make players never feel bored after playing for a long time should be a critical business strategy for game companies and game producers. Besides, it is important to note that attractive characteristics is the strongest predictor of perceived enjoyment, followed by communication characteristics. Based on those information, some practical implications can be conducted. One action is to design games with clear missions and goals for players in each scenario with good tips or them to complete these missions. Moreover, players also love being given more freedom to customize their games. Game makers could ask players what they want to do with their own game customization, and provide options prior to their concerns. In addition to the impact of perceived enjoyment, perceived co-presence also contribute to players' satisfaction about games and their intention to play games. For that reason, mobile game industry, especially online game segmentation, can apply this positive relationship in designing games with high level of interaction and exchanging information among players, not only during the game play but also in the real life.

Moreover, the ability to access the Internet will improve the process of communication among players, and online mobile games with good ability to connect to the Internet and load information are likely to be preferred. Last but not least, satisfaction about games effects on the intention to play games. Thus, game companies and game producers are responsible for providing players with good content and services. Besides, because players are usually required to create a personal account to access online mobile games, it is important for mobile game industry to administrate those accounts carefully, especially for security purposes.

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**Appendix
Research Constructs and Measurement Items**

Code	Constructs/Measurements	References
Image Characteristics (IMA)		
<i>Graphics (GRA)</i>		
I like online mobile games because...		
GRA1	the overall look and feel of the game is visually appealing	C.-S. Kim et al. (2010); Lin et al. (2012); and Calvillo-Gómez et al. (2010)
GRA2	their graphics were appropriate for the type of game	
GRA3	their graphics were related to the scenario	
GRA4	their screen design (i.e. colors, boxes, menus, etc.) is attractive	
GRA5	characters (avatars) closely resemble real people	
<i>Scenario (SCE)</i>		
SCE1	There is a game flow that keeps the gamer interested in the game	C.-S. Kim et al. (2010)
SCE2	The game is preceded by levels according to scenario	
SCE3	There is a background story that keeps the gamer interested in the game	
Communication Characteristics (COM)		
<i>Game Speed (SPE)</i>		
I like online mobile games because...		
SPE1	they rapidly generate the information I need	C.-S. Kim et al. (2010); Wang and Wang (2008)
SPE2	they provide convenient interfaces	
SPE3	they load information rapidly	
SPE4	they are stably supplied	
SPE5	they instantly respond to my input	
<i>Game sound (SOU)</i>		
I like online mobile games because...		
SOU1	their background music is varying	Hwa Hsu et al. (2005)
SOU2	their background music suits the scene	
SOU3	their sound effect is varying	
SOU4	their sound effect suits the event	
Attractive Characteristics (ATT)		
<i>Goal setting (GS)</i>		
GS1	Enough information was provided to the player to identify his objective accurately	Choi and Kim (2004)
GS2	All information necessary to accomplish a goal was provided	
GS3	The game clearly informed the user of his character's goal at present	
<i>Game Option (GO)</i>		
GO1	The game enables players to customize the appearance of their avatars	Teng (2010)
GO2	The game enables players to customize the equipment, accessories and decorations of their avatars	
GO3	The game enables players to create customized goods and equipment for their avatars	
GO4	I can set the game to my taste with a map, scenario, other options and other various selective functions	
Perceived Co-presence (PCP)		
PCP1	As my game skill improves, others begin to recognize me and they think highly of me	C.-S. Kim et al. (2010); Takatalo et al. (2010)
PCP2	Mobile games present proper ways for me to exchange opinions with others	
PCP3	Mobile games present opportunities to meet others	
PCP4	The game effectively allows players to organize a small club, guild, etc. (i.e. voz, vn-zoom, mobay, gamek, etc.)	
Perceived Enjoyment (PE)		
PE1	I felt attracted to online mobile games	Bowman et al. (2013); C. Kim et al. (2010); Pe-Than et al. (2014)
PE2	I became less aware of my surroundings because I was engrossed in playing games	
PE3	I think online mobile game is a good way of sharing information	
PE4	I think there are many new features to explore in online mobile games	

PE5	I think it is worthwhile to play online mobile games	
PE6	I want to play online mobile games longer given the opportunity	
Satisfaction about online mobile games (SAT)		
SAT1	I like the game content of online mobile games	Lu and Wang (2008); B.-W. Park and Lee (2011b); E. Park et al. (2014)
SAT2	I am pleased with the services provided by online gaming vendors	
SAT3	I am satisfied with the account administration of this online gaming vendor	
SAT4	I think that online mobile games are very good	
SAT5	I am satisfied with my decision to play games	
Intention to play online mobile games (INT)		
INT1	Assuming that I have access to the internet, I intend to play online mobile games	C. Kim et al. (2010); Yoon et al. (2013)
INT2	I believe my interest towards the game update will increase in future	
INT3	I will continue to play online games in the future	
INT4	I will frequently play online games in the future	
INT5	I recommend online mobile games to others who intend to play new mobile games	