Relationship between Peer Influence and Gamer's Satisfaction in Purchasing Virtual Items for Online Mobile Games: Mediating Role of Hedonic Value

ABSTRACT

Gaming has long been an interest of studies in the behaviour of youngsters. In particular, game players are spending increasing amount of expenses in purchasing gaming related items. Why mobile game players would purchase virtual items for their games? The aim of this study is to examine the mediating effect of hedonic value to the relationship between peer influence and gamer's satisfaction. Anonymous questionnaire was used to collect data through a survey website. A total of 126 valid responses were collected in the survey. Data collected were first analysed using confirmatory factor analysis, and the conceptual framework was then examined by using the structural equation modelling. Results revealed that there exists a mediating effect of hedonic value on the relationship between peer influence and gamer's satisfaction. They provide valuable insights to game developers and marketers on how to enhance gamer's satisfaction by peer influence through enhancement of hedonic value.

Keywords: Mobile game; Hedonic value; Peer influence; Virtual items; Mediating role; Gamer's satisfaction.

Paper type: Original Research Article

1. INTRODUCTION

Gaming has long been an interest of studies in the behaviour of youngsters. In particular, they are spending increasing amount of expenses in purchasing gaming related items. Why mobile game players would purchase virtual items for their games? One basic advantage, of course, is out of the benefit of better performance. The functionality of the purchased virtual items may generate explicit benefits for game players in hitting goals or managing challenges of difficulty levels for their games. However, other than that, what else would motivate game players to spend more money in purchasing virtual items? There are questions about what motivate game players to trade something virtual with real money?

King of Glory dominated the gaming market in China in 2017 with 200 million registered users and more than 70 million daily active users. In fact, good mobile game apps do not only last long but also make good profitability. Sometimes, simplicity is beauty. Candy Crush successfully extended its target segment to general public through its simple and easy-to-play features. Moreover, the success of these gaming apps might also be out of their exceptionally well-defined marketing and psychological strategies. Considering that the development of a new and sophisticated game application is costly, the business models have been changed. Instead of selling the games as core products, developers and marketers simply give them to the players as freemium. Users are not pushed to pay to try the games, they can even finish playing the complete game without paying a penny. Instead, they are lured to purchase extra lives or supporting weapons if they want to get over the challenges more smoothly. It is where the actual and recurring revenues come from. Another popular mobile game app is Pokemon GO. It is adopted with the technology of augmented reality. It uses Google Maps to integrate the real world with virtual universe. The mission of the users is catching the Pokemon monsters with crucial in-game items by exploring landmarks in the real world. It creates new advertising model that advertisers can be better aligned with their target customers.

Mobile game industry is a huge market. It has grown rapidly in the past decade. Since the launch of the hot games like Candy Crush in 2008, mobile gaming had high penetration to general mobile users. After that, it brought to the next wave with the launch of the games such as Fortnite and Pokemon GO. As reported from TIGA (2016), the most popular gaming apps ranged across the categories of Action/Adventure, Arcade, Puzzle, Strategy and Racing (p.5). Even a small city like Hong Kong, the revenue in the mobile game segment amounted to US$124.7 million in 2016 (Allcorrect Group, 2017, Section of Mobile Games Market in Hong Kong). It was expected that the trend would go on and increase at an annual rate of 22.9%, resulting in a market volume of US$239 million by 2021. In 2021, the worldwide mobile games market was booming even under the impact of pandemic. Consumer spending surpassed $22 billion in Q1 2021, with a 25 percent year-over-year growth. The top five mobile game in the US in 2021 were Roblox, Candy Crush Saga, Coin Master, Lords Mobile, and Pokemon GO (SensorTower, 2021, p.17).

So far, many studies have been conducted to understand the determinants of customer satisfaction and purchase intention. With advancement in technology, buying and selling

virtual game items become more popular and more convenient. It becomes popular for gamers to purchase weapons, pets and skin customizations for their entertainment apps. These types of games are increasing in numbers and spreading across various categories. For example, a digital version of Pokemon cards was launched recently. People are spending an insane amount of real money on buying virtual kittens. One of the popular types of game is battlegrounds. Battlegrounds is a large-scale action game in which up to one hundred players fight in a battle royale. Players can enter the macho either solo or in a team, the last player alive wins the game. For example, PlayerUnknown's Battlegrounds (PUBG) is a multiplayer online battle royale video game developed by PUBG Corporation, a subsidiary of Korean publisher Bluehole. In this game, up to one hundred players parachute onto an island and scavenge for weapons and equipment to kill others while avoiding getting killed. Therefore, it is worth of understanding gamer's psychological and motivation factors in purchasing virtual items.

Mobile gaming is a huge market, and it is growing rapidly. For example, Tencent is the world's largest gaming company based in Shen Zhen, China which released its new mobile battle game Glorious Mission in 2017, such 100-player mobile batter royale game captured massive popularity of PlayerUnknown's Battlegrounds. With much similarity, "King of Glory" is another Multiplayer Online Battle Arena (MOBA) gaming software published by Tencent. According to the report of Statista (2021, China, para. 1), the forecast of revenue in mobile games segment would be amounted to US$41,067 million in 2021. It was expected to have an annual growth rate of 9.68%, resulting in a volume of US$65,177 million by 2026. The average revenue per user (ARPU) would be amounted to US$72.85 in 2021.

In this regard, understanding the attitude and behaviour of online mobile game players is critical to game developers and game providers. With an attempt to gain new insights into the determinants of behavioural intention of young online mobile gamers in purchasing virtual items, a proposed model based on the work of Ho and Wu (2012) on the effect of social value was developed to further investigate the impact of peer influence towards gamer's satisfaction. The purpose of this study is to develop and empirically test a theoretical model on the effect of peer influence toward gamer's satisfaction in purchasing virtual items for online mobile games, and specifically the mediating effect of hedonic value to the relationship between peer influence and gamer's satisfaction.

2. THEORETICAL FRAMEWORK

Nowadays, a huge number of game players purchase virtual items such as gear and weapons for their online mobile games. How would gamers purchase these items, in particular, they are virtual? The theory of consumption values (Sheth, Newman & Gross, 1991) provided insights on how consumers made their choices in their purchase decisions, they included functional, social, emotional, epistemic, and conditional values. Functional value was defined as "the perceived utility acquired from an alternative's capacity for functional, utilitarian, or physical performance" (p. 160). Social value was defined as "the perceived utility acquired from an

alternative's association with one or more specific social groups" (p. 161). They formed the basis in determining why consumers choose to buy or not buy a specific product.

To further explore the psychological aspects in purchasing virtual items and assets, Cleghorn and Griffiths (2015) found that gamers purchased virtual items online for the sake of self-expression, satisfaction and enhancement of friendships. From which, impacts of self-expression and peer influence contributing to user satisfaction are worth noting. The Technology Acceptance Model (TAM) developed by Davis (1989) posited that user adoption to technology was determined by two major factors, perceived usefulness and perceived ease of use. After that, other studies like Bernardo, Marimon and Alonoso-Almeida (2011) found functional quality and hedonic quality were key determinants of purchase intention of e-commerce. Recently, further study from Venkatesh and Davis (2016) revealed that both social influence and cognitive instrumental processes significantly influenced user acceptance and their adoption behavior.

2.1 Effects of Hedonic to Satisfaction

In the study of perceived value in purchasing game items based on the theory of consumption values, Park and Lee (2011) suggested that apart from enjoyment, character competency, visual authority and monetary values, social influence should also be considered to better explain online gamers' behaviours. While studies like Liang (2012) focusing mainly on impacts of personality traits and electronic service quality toward user satisfaction, effect of peer influence in circumstances of purchasing online items had not been considered. To understand which factors influenced user's purchase intention of virtual goods, Ho and Wu (2012) found that functional quality, playfulness and social relationship were determinants of purchase intention. Consistent with these findings, Kim, Gupta and Koh (2011) also found that factors of emotional and social dimensions rather than functional dimension significantly influenced purchase intention of digital items.

Besides, enjoyment not only influences the attitude of online game players, but also generates significant impact to their purchase intention (Wu & Liu, 2007). In the study of intention to play online mobile game, Dang and Nguyen (2015) found that enjoyment was a significant predictor of satisfaction, and it aligned with findings in other studies (Chan, Cheung & Lee, 2014; Revels, Tojib, & Tsarenko, 2010; Yoon, Duff & Ryu, 2013). In this sense, hedonic value is defined as the value a customer receives based on the subject experience of fun and playfulness, and it is a determinant of user satisfaction (Babin, Darden & Griffin, 1994). Literature also showed that happiness had a complementary mediating effect on the relationship between online informational influence and purchase intention (Hsieh & Tseng, 2018). In studying the effect of purchase intention on game items, Yoo (2015) concluded that psychological value should be considered in designing and developing mobile games. It was found that gamers would be more likely to purchase game items if they could provide gamers the feeling of fun.

2.2 Effects of Peer Influence

Apart from functional performance, social interaction is worth noting in enhancing user satisfaction. Relatedness was considered as "fulfilment includes all the socially oriented needs of the user that require interactions with other human beings" (Au, Ngai, & Cheng, 2008, p. 47). Relatedness fulfilment was found to play a significant role in affecting end user satisfaction. Generally, social value is considered as the part of the social influence that gamers do something that they wouldn't otherwise do, because they want to feel accepted and valued by their friends or gaming partners. In studying the role of social value in purchase of digital items, social value was defined as "the utility of a digital item derived from its perceived ability to enhance social well-being" (Kim et al., 2011, p. 5). In the case of mobile gaming, it is common for gamers to share their experience among their peers and even form a team in the game. Peer influence concerns about interactions among online mobile game players. Cheering and commentary analysis from team players promotes team spirit. Very often, game players are provided with online real-time broadcasting features such that their friends may be watching or cheering around. In such cases, it is likely that gamers may be influenced by their peers such that they found higher satisfaction or intention in purchasing digital items such as gear or weapons so as to escalate the level of performance. Study of Choi and Kim (2004) also found that optimal user experience could be attained if the players had effective personal interaction with the system or pleasant social interactions with other people connected to the Internet. However, study of Kim, Koh and Lee (2009) found that it lacked significant evidence that social relationship directly influenced purchase intention.

2.3 The Proposed Research Model

The TAM model was developed by Davis (1989) which denoted that the attitude toward accepting a new technology is a function of the perceived usefulness and perceived ease of use. In considering how consumers made their choices in purchases, the theory of consumption value considered aspects such as the social and emotional values in addition to functional value. In understanding the motivations for mobile game players in purchasing gaming items, Frank, Salo and Toivakka (2015) proposed the conceptual model in three dimensions, namely functional motivation, social motivation, and hedonic motivation. As multiplayer online mobile games become popular, game players would team up with others as partners or interact with friends to share their techniques and experience for fun. Consequently, peer influence may affect the game player's hedonic value, and in turn affect the gamer's satisfaction. In order to provide a deeper understanding about how the social motivation and hedonic motivation interact together to influence the mobile game players, the current study aims to examine the indirect effect of peer influence.

As multiplayer mobile games are becoming more popular, gaming is no longer a solitary activity played by a single individual. Specifically, focus is putting on the hedonic dimension to reflect feeling of gamers in attaining virtual game items. Since hedonic motivation could be a dominant to intention of purchasing game items (Frank, Salo & Toivakka, 2015), the effects of peer interactions and its relationship to hedonic motivation and gamer's satisfaction are

worth noting. The proposed model in this study is based on theory of consumption value to examine the effect of peer influence toward gamer's satisfaction in purchasing virtual items for online mobile games, and specific focus is putting on the mediating effect of hedonic value on the relationship between peer influence and gamer's satisfaction. The hypotheses of the research model were developed as follows.

Hypothesis 1: Peer influence has a positive effect on gamer's hedonic value in purchasing virtual items for online mobile games

Hypothesis 2: Hedonic value has a positive effect on gamer's satisfaction in purchasing virtual items for online mobile games

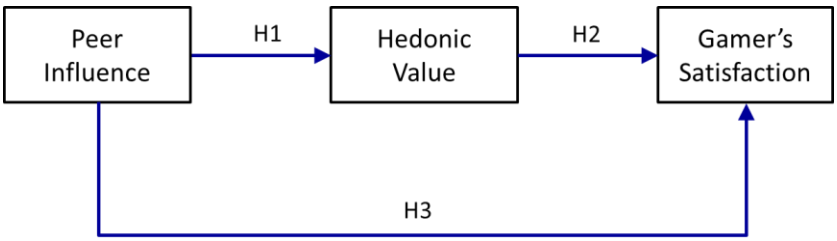
Hypothesis 3: Peer influence has a positive effect on gamer's satisfaction in purchasing virtual items for online mobile games

Hypothesis 4: There exists a mediating effect in hedonic value on the relationship between peer influence and gamer's satisfaction in purchasing virtual items for online mobile games

Based on the review above, the research framework was developed as shown in Figure 1 below.

Figure 1

The proposed research model



3. RESEARCH DESIGN

To address the research questions, an anonymous questionnaire was used to collect data through an online survey website. This study employed a quantitative approach to examine the mediating role of hedonic value toward the relationship between peer influence and gamer's satisfaction in purchasing virtual items for online mobile games.

3.1 Sample and Data Collection

A questionnaire with 18 items was used for the online survey, five items were related to respondent's background while 13 items were related to hedonic value, peer influence and gamer's satisfaction. Details of measurement items are shown in Appendix A. Initially, 182 college students from two institutes, namely the Caritas Institute of Higher Education and the Caritas Bianchi College of Careers, were invited to participate in the survey from March to June 2020. With the snowball sampling method, these first-tier students in turn invited their friends to participate. A total of 126 valid responses were collected in the survey. With an expected effect size of 0.3, three latent variables and 13 observed variables, the minimum sample size for the structural equation model (SEM) should be 119. In this case, the number of responses was considered sufficient for the tests required.

3.2 Measurement

The proposed model was constructed using multiple item measures, and all measures were adopted from prior studies. Three dimensions of the identified factors including peer influence, hedonic value and gamer's satisfaction were measured by 13 items. Four items of peer influence were adopted from the study of Kim et al. (2009), six items of hedonic value were adopted from the study of Frank et al. (2015), and three items of gamer's satisfaction were adopted from the study of Brady et al. (2005). All items were evaluated using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The survey instrument was pilot-tested on a small group of students to assess the instrument's face validity and clear up any ambiguity and wording issues. A pre-test of the questionnaire was conducted to assess the content validity of the measurement scales. First, the link to online questionnaire was forwarded through e-mail to five users. The e-mail outlined the purpose of the study and requested the participants to answer, review and critique the attached questionnaire. Three of the respondents replied with useful suggestions while the other two found no amendment needed. After reviewing the comments collected from the respondents, some items were reworded to improve clarity. Appendix A illustrates all the scale items used in the survey questionnaire.

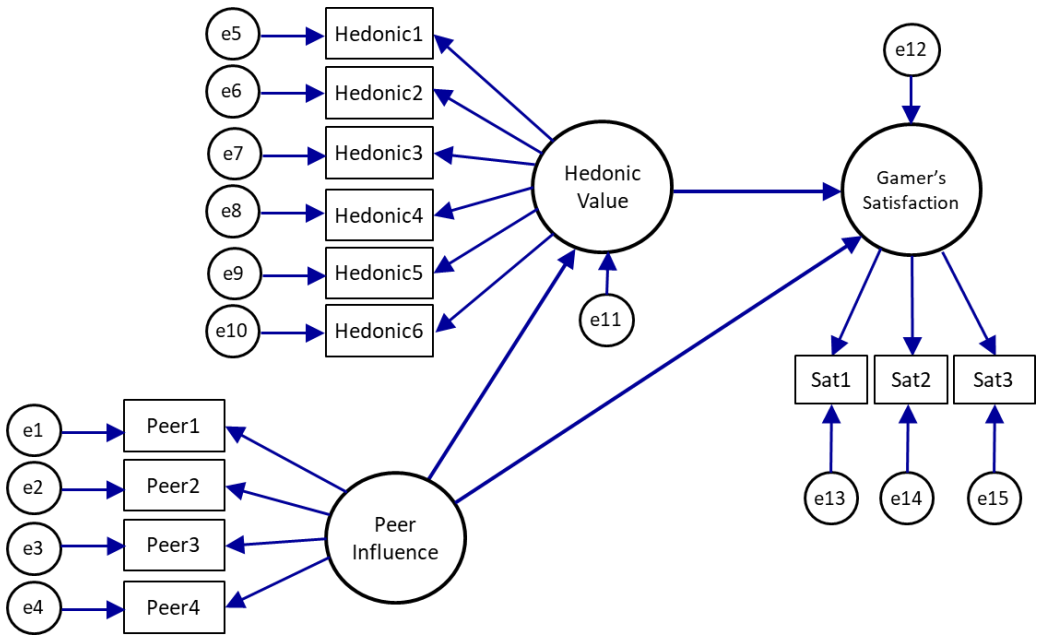
3.3 Data Analysis

The data analysis was conducted in two steps, the first part used confirmatory factor analysis (CFA), and the second part analysed the conceptual framework with the structural equation model. The data collected were analysed using Statistical Package for the Social Sciences (SPSS) version 24 and Structural Equation Model (SEM) with AMOS 24. The goodness of

model fit indicates the overall performance of the model. The structural model is presented in Figure 2.

Figure 2

Path diagram of the structured equation model



First, composite reliability and Cronbach's alpha values were used to assess the construct reliability. Second, convergent validity and discriminant validity were used to assess the construct validity. Convergent validity refers the degree of confidence that a trait is well measured by its indicators, while discriminant validity refers to the degree to which measures of different traits are unrelated (Campbell & Fiske, 1959). In other words, construct validity measures the degree to which a particular construct is actually measuring that construct it claims, while discriminant validity shows that two measures are not supposed to be related are actually unrelated. Then, the Average Variance Extracted (AVE) was used to evaluate the convergent validity and discriminant validity. The acceptable value of AVE should be greater than .5 (Hair, Black, Babin, Anderson & Tatham, 2006) while discriminant validity is demonstrated if the variance extracted estimates are greater than the corresponding squared correlation (Fornell & Larcker, 1981).

To examine the proposed model, linear structural equation modelling was applied to accomplish the purpose of model building for this study. Then path analysis was used to model and analyse the relations among the latent variables. Finally, a number of goodness-of-fit indicators were used to examine the degree of fitness of the overall model.

4. RESULTS

In the present study, data were gathered from 126 respondents through an online survey. In the preliminary data preparation, no outlying cases were detected. It was confirmed that the assumptions of normality and linearity had been satisfied before further analysis. The results are illustrated as follows. First, a summary of sample characteristics provided the background profile of the respondents. Second, internal reliability, convergent validity and discriminant validity were examined. In analysis of a linear structural model, confirmatory factor analysis (CFA) was used to examine the variables of hedonic, peer influence and gamer's satisfaction. The structural equation modelling was divided into two parts, the measurement model which relates measured variables to latent variables, and the structural model which relates latent variables to one another. In model testing, the model was examined by first confirming the goodness-of-fit of the measuring model, then performing the path analysis, and finally verifying whether the goodness-of-fit of the overall model was consistent with the goodness-of-fit indices.

4.1 Sample Characteristics

A total of 126 responses, 49 (38.9%) male and 77 (61.1%) female were collected from the survey. Most of the respondents were in the age group of 21 to 23 (42.9%), followed by the age groups of 18 to 20 (31.0%) and 24 to 26 (15.1%). Most of the respondents spent less than 5 hours per week on mobile gaming (68.3%) followed by the group who spent 6 to 10 hours per week (17.5%). In term of education level, majority was from the group of sub-degree level (61.9%) followed by the group of bachelor's degree level (36.5%). Details of sample characteristics can be found in Appendix B.

4.2 Reliability and Validity

Validity of the questionnaire was assessed by examining the reliability of each variable. Cronbach's alpha value was used to measure the internal consistency of the variables. As shown in Table 1, scales of hedonic value and peer satisfaction had high Cronbach's alpha values of .916, and .753 respectively, while peer influence had Cronbach's alpha value below .7.

Table 1

Reliability Statistics of Variables

Variable	No. of Items	Cronbach's Alpha
Hedonic Value	6	.916
Peer Influence	4	.386
Gamer's Satisfaction	3	.753

Regarding the case of peer influence, the Cronbach's alpha value could be significantly increased if item Peer4 was deleted. After careful consideration, the item was then removed. Further analysis on the effects of individual items is depicted in Table 2.

Table 2

Item-Total Statistics of Variables

Item	Scale mean if item deleted	Scale variance if item deleted	Corrected item-to-total correlation	Alpha if item deleted
Hedonic1	16.18	16.502	.764	.901
Hedonic2	16.20	16.368	.765	.901
Hedonic3	16.13	16.102	.719	.908
Hedonic4	15.90	15.709	.824	.893
Hedonic5	16.02	15.623	.830	.892
Hedonic6	15.87	16.704	.685	.912
Peer1	9.40	28.755	.436	.283
Peer2	9.52	28.811	.435	.284
Peer3	9.55	29.970	.419	.291
Peer4	9.43	5.991	.291	.821
Sat1	6.23	2.915	.290	.970
Sat2	6.33	5.264	.594	.353
Sat3	6.36	5.287	.588	.359

Table 3 presents the corresponding Cronbach's alpha values after removal of the item. According to Nunnally (1978), the Cronbach's alpha value should be greater than .7. As shown in Table 3, the Cronbach's alpha values are all greater than .7, and thus the interitem reliability is acceptable.

Table 3

Reliability Statistics of Variables after Removal of corresponding Items

Variable	No. of Items	Cronbach's Alpha
Hedonic Value	6	.916
Peer Influence	4	.821
Gamer's Satisfaction	2	.946

4.3 Confirmation of Goodness-of-fit of the Measurement

After assessing the internal reliability of the scales, factor loadings, convergent validity and discriminant validity were also examined. First, factor loading was used to measure the strength of the linear correlation between the manifest variables and the latent variables. In general, the closer the factor loading is to one, the more the explicit variables were able to measure the implicit variables. As presented in Table 4, results show that the factor loadings range from .715 to .892, all the variables are greater than .7. Thus, the manifest variables adequately measured the latent variables.

Table 4

Factor Analysis for the Dimensions

Latent Variable	Manifest Variable	Factor Loading	Average Variance Extracted (AVE)	Composite Reliability (CR)
Hedonic Value	Hedonic1	.758	.649	.917
	Hedonic2	.766		
	Hedonic3	.746		
	Hedonic4	.892		
	Hedonic5	.885		
	Hedonic6	.773		
Peer Influence	Peer1	.843	.611	.824
	Peer2	.781		
	Peer4	.715		

The reliability of the measures was calculated with average variance extracted (Fornell & Lacker, 1981) and composite reliability index (Bagozzi & Yi, 1998). To validate the survey instrument, convergent validity and discriminant validity were used to assess the construct validity. First, convergent validity was established by examining the standardized path loading, average variance extracted (AVE) and composite reliability (CR) (Gefen et al., 2000). Second, discriminant validity was assessed by examining the correlations among the factors. Average variance extracted (AVE) was used to calculate the variance explanation capability of the implicit variables with respect to each explicit variable. In general, the higher the variance extracted value, the higher the reliability and convergent validity. In this study, a value of .5 was considered as the acceptable value. Results in Table 4 show that all AVE values were greater than .5, they indicate that the explicit variables have high reliability and convergent validity. As shown in Table 4, all estimates of factor loadings for the items are

significant. In fact, all factor loadings are above .5, and most of them are .7 or above. Since the values of AVE for the constructs are above .5 and the values of CR for the constructs are above .7, the measurement model is considered acceptable in term of convergent validity. In addition, discriminant validity tests whether concepts or measurements that are supposed to be unrelated are actually unrelated. Results show that all the variance-extracted estimates (with values of .649 for hedonic value and .611 for peer influence) are greater than the corresponding squared correlations (r2 = .432) as shown in Table 5. Therefore, discriminant validity was also satisfied.

Table 5

Correlation between Latent Variables

Correlations	Estimates	Squared Correlation
Between Peer Influence and Hedonic Value	.657	.432

4.4 Path Analysis

After confirming the goodness-of-fit of the model, the following tables present the results of path analysis. As shown in Table 6, both the path coefficient of peer influence with respect to hedonic value (.619) and the path coefficient of hedonic value with respect to gamer's satisfaction (.770) were significant.

Table 6

Path Analysis of the Structural Model

Path coefficient between implicit variables	Estimate	SE	CR	p
Peer Influence → Hedonic Value	.619	.087	7.088	< .001
Hedonic Value → Gamer's Satisfaction	.770	.173	4.457	< .001
Peer Influence → Gamer's Satisfaction	.185	.132	1.407	.160

The indirect effect is the product of the effect of peer influence toward hedonic value and hedonic value toward gamer's satisfaction, which is equal to .477. The R square values depicted in Table 7 below show the degree of explanation of independent implicit variable with respect to the dependent implicit variable. It indicates that 38.3 percent of the variance in hedonic value can be explained by the variance of peer influence and 59.3 percent of the variance of gamer's satisfaction can be explained by the variance of hedonic value.

Table 7

Path Coefficient of Determination

Path coefficient between implicit variables	R^2
Peer Influence → Hedonic Value	0.383
Hedonic Value → Gamer's Satisfaction	0.593

4.5 The Goodness-of-fit of the Overall Model

Structural equation modelling was used to examine the relations among the latent variables and test the measurement reliability. Structural model analysis contains the fitness analysis and the explanatory power of the overall research model (Wu, 2009). Major fitness indices including Chi square to degrees of freedom ratio (CMIN/DF), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Squared Residual (RMR) and Root Mean Square Error of Approximation (RMSEA) are summarized in Table 8.

Table 8

Summary of fit indices for measurement model

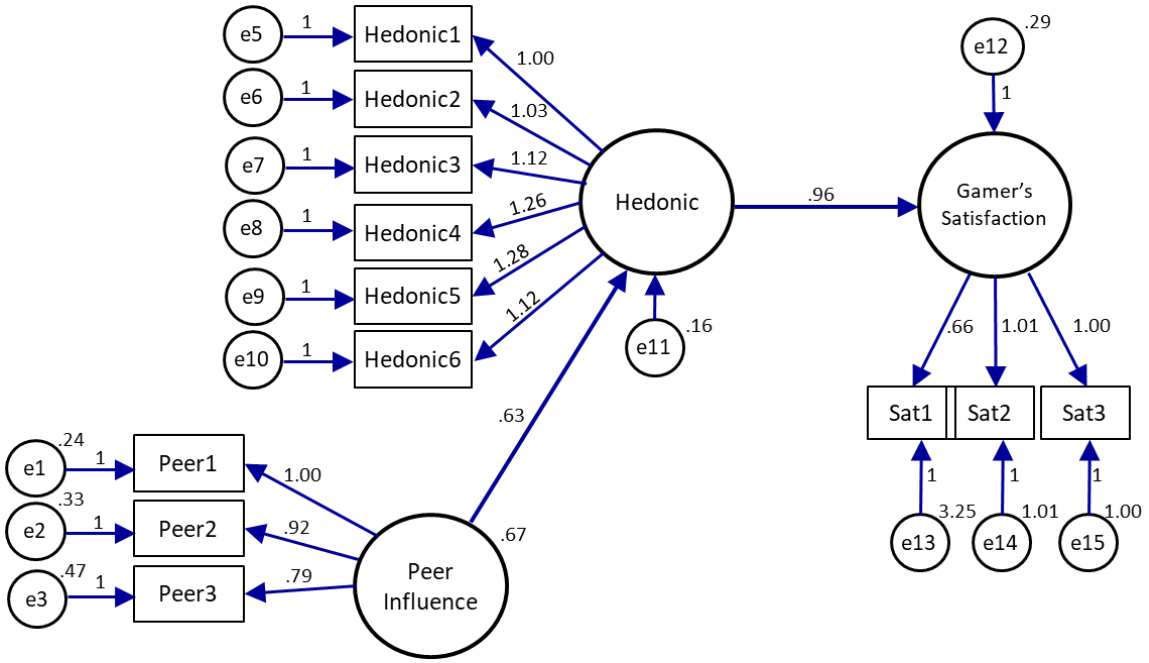
Category	Determination Index	Cut-off Point	Fit Value
Parsimonious fit	χ^2/df	< 5	1.095
Incremental fit	GFI	> .9	.938
	NFI	> .9	.956
	CFI	> .9	.996
	RMR	< .05	.037
Absolute fit	RMSEA	< .08	.028

First, CMIN/DF is an index referring how much the fit of data to model has been reduced by dropping one or more paths. The value of CMIN/DF is 1.095 (< 5) and thus fulfilled the requirement. Second, GFI tells the proportion of the variance in the sample variance-covariance matrix is accounted for by the model. The value of .938 (< .9) is sufficient to indicate a good fit. Moreover, incremental model fit was also assessed. NFI of .956 (< .9) is significant to indicate a good fit. Besides, CFI is a good index for the use of small sample size. The value of .996 (> .9) also indicates that it is a good fit. RMR is the square root of the difference between the residuals of the sample covariance matrix and the hypothesised

covariance model. In this case, standardization is not necessary as all items were measured in the same range of scale from one to five. RMR of .037 (< .05) indicates a well-fitting model. In addition, RMSEA estimates the fitness compared to the saturated model. The value of .028 (< .08) in RMSEA which is sufficient to indicate a good fit. As a whole, these values indicate a good fit between the model and the observed data. The schematic diagram of the standardized results is shown in Figure 3 below.

Figure 3

Schematic diagram of the standardized results



5. DISCUSSION

This paper has sought to examine the effect of peer influence toward gamer's satisfaction in purchasing virtual items for online mobile games and specifically the mediating effect of hedonic value on the relationship between peer influence and gamer's satisfaction.

5.1 Descriptive statistics

The survey subjects of this research were mainly college students studying in two tertiary education institutes in Hong Kong. Overall, about 61% of the respondents are female and 39% are male. The gender distribution is of similar proportion as the general gaming population. Most of the respondents fell in the groups who spent less than five hours in playing mobile games, followed by the group who spent six to ten hours a week.

5.2 Validity of the Measurement Instruments

First, Cronbach's alpha values were used to assess the interitem consistency among the measuring items. Then, convergent validity tested whether constructs were related as expected. In addition, discriminant validity tested whether constructs that should have no relationship really had not relationship. According to the results, all items exhibit high loadings (> .7) on their respective constructs and have stronger average loadings than they are on other constructs. Table 4 shows that all AVE values are greater than .5 and CR values are greater than .7. They confirm that convergent validity is acceptable. In addition, it shows that all variance-extracted estimates are greater than the corresponding squared correlations, and thus satisfied the discriminant validity. These results provide sufficiently strong evidence of reliability, convergent validity and discriminant validity of the measurement instruments.

5.3 Path Analysis Results of the Structural Model

After confirming the validity of the measurement instruments, the structural equation modelling was applied to examine the relations among the latent variables; the overall goodness-of-fit indicators were used to examine the overall model. As shown in Table 8, the goodness-of-fit for the overall model was χ^2/df = 1.095; GFI = .938; NFI = .956; CFI = .996; RMR = .037; and RMSEA = .028. Results show that the following relations as suggested by Bagozzi & Yi (1988), χ^2/df, < 5; GFI > .9; NFI > .9; CFI > .9; RMR < .05; and RMSEA < .05 were satisfied.

Next, the hypotheses were tested by examining path coefficients and their significance levels in the structural model. Results supported Hypothesis 1 that peer influence has a positive effect on hedonic value in purchasing virtual items for online mobile game and Hypothesis 2 that hedonic value has a positive effect on gamer's satisfaction in purchasing virtual items for online mobile game. Hypothesis 3 that peer influence has a positive effect on gamer's satisfaction is not significant. It indicates that direct effect of peer influence toward gamer's satisfaction was not supported. In contrast, the overall results imply that the effect of peer influence is going through the mediator, the hedonic value, toward gamer's satisfaction. Therefore, the mediating effect of hedonic value on the relationship between peer influence and gamer's satisfaction as specified in Hypothesis 4 is supported. With further analysis in path coefficient of determination, Table 9 shows the path coefficients and significance levels for the hypotheses. Results show that peer influence explains 38.3% of the variance in hedonic value, while hedonic value explains 59.3% of the variance in gamer's satisfaction. After all, it is concluded that the path coefficients for the posited model are statistically significant.

Table 9

Empirical Results of Hypotheses

Hypothesis	Path relationship	Estimate	Support or not
1	Peer Influence → Hedonic Value	.619***	Support
2	Hedonic Value → Gamer's Satisfaction	.770***	Support
3	Peer Influence → Gamer's Satisfaction	.185	Not support
4	Mediating effect of Hedonic Value on the relationship between Peer Influence and Gamer's Satisfaction	--	Support

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Consistent with previous studies, hedonic value was significant in predicting gamer's satisfaction. In addition, analysis of the mediating effect validated the significant role of hedonic value toward the level of gamer's satisfaction. That means peer influence has indirect effect on gamer's satisfaction through gamer's hedonic values.

5.4 Theoretical Implications

From the theoretical perspectives, findings made a step forward in research on the indirect effect of peer influence through gamer's hedonic value to their satisfaction in purchasing virtual mobile game items. Prior study (Sheth et al., 1991) found that functional, social, emotional, epistemic and conditional values were the key determinants for user satisfaction and purchase intention. In the context of mobile gaming, Cleghorn and Griffiths (2015) investigated further the impacts of self-expression, satisfaction and enhancement of friendships toward their purchase intention of virtual items for gaming. They reflected the important roles of peer influence and hedonic value toward satisfaction of mobile gamers. Although previous studies have received considerable empirical validation in the hedonic dimension, there lacked deeper understanding on how gamers would enhance their hedonic values, and thus the level of satisfaction. In this research, results shed light on the importance of peer influence, and validated its influence toward gamer's satisfaction through enhancing their hedonic values.

5.5 Managerial Implications

In practical terms, this study provides deeper understanding about how mobile gamers are influenced to purchase virtual items for gaming. Nowadays, game players are not restricted to the circle of friends around them, but they extend beyond the physical space over the cyber world. Single-player games are very different from multiplayer games. In multi-player games, players need to coordinate with other team members to accomplish their goals. In that sense,

competence of individual gamers takes a critical role for the team's success. Inevitably, individual player exerts pressure to other team members in accomplishing their common goals as well as experiences pressure from other team members for better performance.

When game players perceive that purchasing virtual gaming items can enhance their performance in games, and consequently establish stronger bonding and better relationship with their team players, peer's recognition and encouragement have positive effects in enhancing gamer's hedonic value. Such findings imply that it is desirable for game developers or vendors to develop online mobile games that involve team spirit and collaboration in tactics with the use of various virtual weapons for the games. With games requiring stronger bonding and collaboration among game players, possibly players may enhance relationship with their team players through attaining virtual items such as gear or weapons. Consequently, they may attain higher level of satisfaction for their purchased mobile games items.

Based on the findings, the following recommendations are proposed to game developers and marketers. It is essential for game developers to identify the drives for collaborative gameplay. First, in order to promote collaboration among gamer players, games demand not only individual skills but also collaboration among teammates to develop good tactics. In such circumstances, the purchased items provide incentives through empowering not only an individual player, but also the performance of the whole team. This can be achieved through reporting group scores from time to time. Second, the team achievement must be recognized. Introducing interim applause or stage congratulations would promote peer influence. By popping up scores of team performance, players would receive recognition when they outperform others. Moreover, the purchased virtual items not only empower individual performance but also enable individual players to offer assistance to their teammates. For example, with a particular type of purchased weapon, a player may save his or her teammates from losing the game at certain critical moments of time. After all, these small features may generate the kind of peer influence which in turn increase the hedonic values of the gamers, and thus enhance their satisfaction level in purchasing virtual items for their games.

5.6 Limitations

There are several limitations in the current study. First, this study was conducted in Hong Kong and targeted to college students or young adults only. The participants in this study were mainly in the age between 25 and 30; they might possess attributes and behaviour that differ from the larger population of mobile gaming world. However, gaming is cross-gender and cross-generation, though segments of high-school students and middle-age adults were not included in the study. Second, different categories of online games may involve peer collaboration at different levels; peer influence may affect gamers to different extent with different online games. Therefore, further research can generalize the subjects to wider demographic backgrounds and consider the effects on mobile games of different categories.

6. CONCLUSION

The Technology Acceptance Model (TAM; Davis, 1989) has been one of the most influential models for technology acceptance. There are two primary factors influencing an individual's intention to use new technology, namely perceived ease of use and perceived usefulness. It serves as a useful general framework to investigate the factors that influence consumers in using new technology. To understand how consumers made their choices in purchases, Sheth, Bruce and Barbara (1991) identified five consumption values influencing consumer choice behaviour. Apart from functional value, there were conditional value, social value, emotional value and epistemic value. As in the case of gaming, Frank, Salo and Toivakka (2015) depicted that other than functional motivations, social motivations and hedonic motivations might influence the purchase intention of game players in purchasing virtual items for gaming. Today, most of the online mobile games are bonded with certain online multiplayer communities, the influence of social and hedonic motivations is taking a critical role in driving the game players' satisfaction. This study provides an empirical analysis on the mediating effect of hedonic value toward the relationship between peer influence and game players' satisfaction in purchasing virtual items for online mobile games.

The present study addressed the issues of how to satisfy mobile gamers in purchasing virtual items for gaming. The results of this study showed that although peer influence did not affect gamer's satisfaction directly, there was a significant indirect effect of peer influence toward gamer's satisfaction through hedonic value. The results revealed that there exists a mediating effect of hedonic value on the relationship between peer influence and gamer's satisfaction. A primary contribution of this study is that it highlights the role of peer influence and hedonic value in satisfying online mobile game players. Game developers and game marketers should take consideration of the effect of such peer influence in creating virtual items which increases the gamer's hedonic value and thus their satisfaction. New features of games should not be restricted to the functional aspects. Instead, game designers and developers should take into consideration that the kind of peer influence invoked through the virtual items as it may enhance gamer's satisfaction.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

Contributions and Further Research

This study makes contribution to both academic literature and practical implication. First, prior research examined the impacts like functional, social, emotional, epistemic and conditional values. This study contributes to the literature in revealing that peer influence has

an indirect effect to the gamer's satisfaction. It provides empirically proven results which extend previous studies by considering the factor of peer influence in addition to the functional and hedonic dimensions. Traditional studies like the TAM model (Davis, 1989) focused on the functional dimension in determining the level of acceptance of new technology. With a broader consideration to consumer choices, prior studies such as the theory of consumption value (Sheth, Newman & Gross, 1991) highlighted the importance of social value and emotional value. As in the field of gaming and mobile items, it was proposed that social motivation and hedonic motivation would affect the game item purchase intention. This study builds on prior works in this area and helps to examine the mediating effect of hedonic value toward the relationship between peer influence and the level of satisfaction of game players in purchasing virtual items for online mobile games.

In addition, this study provides practical implications for game developers and marketers in designing mobile games, in particular, seeking ways for enhancing gamer's satisfaction. The results of this study revealed that peer influence affect the level of game player's satisfaction through enhancing the hedonic value. Game developers can design and develop the kinds of virtual items of online mobile games that induce stronger peer influence through various means. For instances, they can develop games requiring strong team collaboration; report skill levels of individuals and scores of the team time to time; and introduce virtual items or weapons in the games such that they can not only empower gamers' performance but also enable them to save or rescue their teammates. The desires of game players for being outperformed and competent in securing their teammates may induce the sort of hedonic value, and in turn enhance their satisfaction with the virtual items in the games. For example, provision of cheering and commentary analysis from team players can also promotes team spirit. Very often, game players are provided with online real-time broadcasting features such that their friends may be watching or cheering around. Further research may continue to examine the effect of peer influence over mobile games of different categories in different segments of game players.

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APPENDIX A: CONSTRUCT AND MEASUREMENT ITEMS

Construct	Measurement items
Hedonic1	They are aesthetically appealing.
Hedonic2	They make my character look better.
Hedonic3	They have enjoyable sound effects.
Hedonic4	They make the game more exciting.
Hedonic5	They stimulate my curiosity.
Hedonic6	They increase immersion in the game.
Peer1	They help to work as a team.
Peer2	They provide effective communication tools for the game.
Peer3	They make me respected by other players.
Peer4	They make my character look cooler for others.
Sat1	I am satisfied with the virtual asset of the game.
Sat2	I am happy with the virtual asset of the game.
Sat3	I am delighted with the virtual asset of the game.

APPENDIX B: SUMMARY OF SAMPLE CHARACTERISTICS

Characteristics	Frequency	Percentage
Gender		
Male	49	38.9%
Female	77	61.1%
Total	126	100%
Age		
18 – 20	39	31.0%
21 – 23	54	42.9%
24 – 26	19	15.1%
27 – 29	8	6.3%
30 or above	4	3.2%
Missing	1	0.8%
Total	126	100%
Usage Frequency		
Less than 5 hours	86	68.3%
6 – 10 hours	22	17.5%
11 – 15 hours	9	7.1%
16 – 20 hours	5	4.0%
21 hours or above	4	3.2%
Total	126	100%
Education		
Secondary school or below	1	0.8%
Associate degree or higher diploma	78	61.9%
Bachelor's degree	46	36.5%
Master degree or above	1	0.8%
Total	126	100%