An empirical analysis of online game service satisfaction and loyalty

Hao-Erl Yang *, Chi-Chuan Wu, Kuang-Cheng Wang

Department of Business Management, Tatung University, Taipei, Taiwan

Abstract

In this study, we argue that there will have some factors affecting online game service satisfaction and loyalty. The purpose of this study is to understand an online game service model. This model contains several dimensions including experiential value, transaction cost, and service quality, the three antecedents of online game service satisfaction and loyalty and test the associations among the constructs in it. After surveying some players in Taiwan, we found that three antecedents have significant and positive effects on online game service satisfaction and which, in turn, significantly affect online loyalty. Especially, service quality has the relatively higher total positive effects on both online game satisfaction and loyalty. Meanwhile, online game satisfaction completely mediates the effects of these three antecedents on online loyalty. The findings imply that how to manage online game service quality better, provide more acceptable transaction cost, and offer more experiential value are the key ways for effectively enhancing players' satisfaction with the online game service in order to retain their loyalty to the online game service system. Because to keep competitiveness of online game industry is hard to hard, we hope this model can provide online game corporate to select and adopt the key point what the online game corporate should choose and how to affect the key factors of online game service satisfaction and online loyalty in online game industry.
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1. Introduction

According to a report from DFC Intelligence (2006) the worldwide online game market is forecasted to grow from $3.4 billion dollars in 2005 to over $13 billion in 2011, indicating that the potential increase of the number of online game users. In the US, with multiplayer games being an established factor in game market in 2004, the computer and video game market exceeded $7.3 billion. This year 42% of most frequent game players are playing online (Dick, Wellnitz, & Wolf, 2005). In Taiwan a survey data showed that the number of Internet subscribers in Taiwan had reached 13.76 million and there were 9.52 million regular Internet users at the end of September 2005, with an Internet penetration rate of 42% (FIND, 2006). Having been shifted to entertainment with noticeably increasing number of online game users, online game has attracted

providers entering the industry. The huge Internet users made the opportunity for the rise of online-only game companies to enter the online game industry and that are making the marketplace more competitive for established players (DFC Intelligence, 2006). How to retain the existing online game users and entice new ones have attracted both practitioners and academicians to pay more attention to it.

The literatures revealed that the immediate factor affecting consumers to retain loyalty to the providers is customer satisfaction (Cronin, Brady, & Hult, 2000). Similarly, in a B2C channel satisfaction model or online shopping satisfaction model, satisfaction is considered as an important construct because it affects participants' motivation to stay with the channel and regarded as an antecedent of repurchase (Devaraj, Fan, & Kohli, 2002; Skogland & Siguaw, 2004; Yi & La, 2004; Yang & Lin, 2006). But what are the key factors that can make them satisfied with the products and services, which, in turn, enhance their loyalty, especially, in online game service environment, are still under study (Dick et al., 2005). The purpose of this study

* Corresponding author.
 E-mail addresses: heyang@ttu.edu.tw (H.E. Yang), ccwu@ttu.edu.tw (C.C. Wu), kcwang@ttu.edu.tw (K.C. Wang).

is to empirically assess an online game service satisfaction and loyalty model, including experiential value, transaction cost, and service quality, the three antecedents of online game service satisfaction and loyalty and test the associations among the constructs in the model.

2. Conceptual background

2.1. Experience value

Experience value can be divided into two parts: utilitarian value and hedonic value.

2.1.1. Utilitarian value

Utilitarian consumer behavior has been described as task-related, and rational (Batra & Ahtola, 1991). Perceived utilitarian shopping value might depend on whether the personal need shopping was accomplished, often, this means a product is purchased in considered and efficient manners. This shopper may find value only if the shopping is completed successfully to get everything done (Babin, Darden, & Griffin, 1994). Koufaris, Kambil, and Labarbera (2001) proposed that utilitarian value (time saving, control, better product information) endued by interactivity affecting approach responses toward a product or website.

2.1.2. Hedonic value

Shopping research has long emphasize the shopping experience on the utilitarian aspects, which has often been described as task-related and rational (Batra & Ahtola, 1991) and related closely to whether a product acquisition mission was successfully accomplished or not (Babin et al., 1994). However, traditional product acquisition explanations may not fully portray the totality of the shopping experience (Bloch & Richins, 1983). Because of this, the last several years have seen resurgent interest in the shopping experience on the hedonic aspects and researchers have recognized the importance of its potential entertainment and emotional worth (Babin et al., 1994).

Hirschman and Holbrook (1982) described consumers as either "problem solvers" or in terms of consumers seeking "fun, fantasy, arousal, sensory stimulation, and enjoyment". This mainly depended on people view shopping as a work or view shooing as fun. Utilitarian value involves shopping efficiency and making the right product choice based on logical assessment of product information, on contrary, consumers view shopping as an adventure. Hirschman and Holbrook (1982) thought these forms of pleasure as the experiential (hedonic) value of the consumption experience, so hedonic value differs from utilitarian value.

2.2. Transaction cost

The concept of transaction cost was represented by Coase (1937), broken that in traditional economic background people consider transaction will run perfectly in market mechanism and there were no transaction costs. Transaction was affected from uncertainty and bounded rationality of environment and will generate many transaction costs. Williamson (1987) extend and develop a more completely theory of transaction cost.

The framework of transaction cost analysis (TCA) builds on the interplay between two main assumptions of human behavior—bounded rationality and opportunism, and three dimensions of transactions—asset specificity, uncertainty, and frequency (Devaraj et al., 2002).

2.2.1. Asset specificity

A specialized investment that cannot be redeployed to alternative uses or by alternative users excepted at a loss of productive value. Asset specificity can take several forms, of which human, physical, site, and dedicated assets are the most common.

There are four main types of asset specificity determined by Williamson (1987):

- *Site specificity*: It is observed when firms and plants are located in close proximity in order to minimize transportation and inventories. Since these assets are immobile, the setup/relocation costs are high.
- *Physical asset specificity*: It refers to plant, machinery, and technology that are specific to a transaction.
- *Human asset specificity*: When employees require substantial training and "learn by doing", the cost of autonomous contracting over an employment relation increases, making common ownership of successful stages more desirable.
- *Dedicated asset specificity*: It involves making investments in dedicated assets on the behalf of a particular buyer.

2.2.2. Uncertainty

According to Liang and Huang (1998), there are two uncertainties: first, consumer thought the product may not conform to his expectation, is product uncertainty, second, consumer may not believe completely in transaction process, is process uncertainty.

2.2.3. Frequency

When transaction has attribute of asset specificity, frequency decided that the investment cost can be covered. When frequency times are more frequently, investment cost more possibly can be covered.

Therefore, we know what factors cause exchanged difficult and generate transaction cost is the interaction effects among human bounded rationality and opportunism, environmental uncertainty and complexity, information asymmetry, small number and transaction characteristic.

Williamson (1987) notes that a transaction occurs when goods or services are transferred across a technologically separable interface. Transaction costs are added to production costs and should include the market transaction costs and the costs of intrafirm managerial transactions (Masten,

James, & Edward, 1991). Transaction costs for retail market organizations such as online stores consist of (1) market transaction costs for searching, bargaining, and after-sale activities and (2) managerial transaction costs to run a store. The market transaction costs measure the efficiency level of the interactions of buyers and sellers during a particular market setting, while the managerial transaction costs measure the process efficiency in market organizations. In the context of market transaction costs, as a potential consumer attempts to make an online purchase, the site may provide the product image, description, price, and feedback from other customers, in an easy-to-read format (Devaraj et al., 2002). Therefore, transaction costs are captured with time efficiency. Time efficiency is a measure of the transaction time costs. Becker (1965) suggests that the consumer maximizes his or her utility subject to not only income constraints but also time constraints. By reducing information asymmetry and error, such as delivering wrong products and missing delivery dates, customers find online shopping easy to use and less time consuming.

Price savings can be considered as a measure of store efficiency because as managerial costs decrease, savings could be passed on to consumers. The transaction costs of financial markets generally include commission fees, bid-ask spread, and price impact costs. These costs are the compensation to market makers or dealers and are considered as a measure of market efficiency. As market institutions become more efficient, the cost of trading is lowered and consumers get better prices.

In conclusion, transaction costs include two dimensions: time efficiency and price saving. Time efficiency are measures of the costs between buyer and seller interactions, relative price saving is a measure of online or conventional store transaction efficiency.

2.3. Service quality (SERVQUAL)

Parasuraman, Zeithaml, and Berry (1985) suggested the most difference between service and goods are four characteristic: intangibility, perishability, heterogeneity, and inseparability. Therefore, the focus has different between service marketing and products marketing. Because service quality has more subjectively than product quality of consumer, service quality evaluated more difficult than product quality.

Parasuraman et al. defined that service quality is a global judgment, or attitude, relating to the superiority of the service, and superiority is the gap which practical service higher than consumer expectation. When expectative service level is equal to perceived service level then it has general service quality. When perceived service level is higher than expectative service level then it has better service quality. When perceived service level is lower than expectative service level then it has worse service quality.

Parasuraman et al. introduce ten dimensions to measure service quality and suggest that it can be used in any service

model. Three authors, PZB, use factor analysis to simplify twenty-two items to five dimensions, called SERVQUAL (Service Quality), listed as follow:

1. *Tangibles*: Physical facilities, equipment, and appearance of personnel.
2. *Reliability*: Ability to perform the promised service dependably and accurately.
3. *Responsiveness*: Willingness to help customers and provide prompt service.
4. *Assurance*: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
5. *Empathy*: Caring, individualized attention the firm provides its customers.

In electronic commerce, service quality measures have been applied to assess the quality of search engines and factors associated with Web site success. However, consumers' perceptions of online service quality remain unexplored. There are indications that electronic commerce service issues go beyond product price and may be the reason for consumers' preference for the channel. SERVQUAL, a widely utilized instrument in marketing research to measure customers' expectation and perception of service, was recently adapted to measure IS service quality. This study uses four dimensions of SERVQUAL, which include reliability, responsiveness, assurance, and empathy, to measure the users' cognition of SERVQUAL in online channel.

3. Hypotheses

3.1. Theoretical framework

An increasing electronic commerce research work has been done on the antecedents and consequences of consumer online satisfaction by adopting constructs from different theoretical frameworks in order to identify the key antecedents and explain the effects of them on the consequences in the model (Devaraj et al., 2002; Lim & Dubinsky, 2005; Rodgers, Negash, & Suk, 2005; Yang & Lin, 2006). However, to our best knowledge, no such integrated models are employed to investigate online game player's satisfaction with and loyalty to the game service system provided. An integrated theoretical framework, including the constructs proposed by technology acceptance model (TAM), transaction cost analysis (TRC), and service quality (SERVQUAL), was developed and validated by Devaraj et al. (2002) and they demonstrated that metrics derived from traditional models in marketing, economics, and psychology can be successfully applied in e-commerce to determine customer preference.

A lot of empirical studies have been conducted on TAM with the conclusion that it is believed to be more parsimonious, predictive, and robust, especially, the correlation between usefulness and acceptance, and that between usefulness and ease of use are somewhat strong, but that between ease of use and acceptance is weak (Ma & Liu,

2004). On the other hand, past research revealed that traditional and electronic shopping experiences can indeed produce both utilitarian and hedonic value, the two dimensions of experiential value (Babin et al., 1994; Wolfinbarger & Gilly, 2001; Fiore, Kim, & Lee, 2005). Interactivity of a website is seen as offering utilitarian value of saving time/effort and increasing likelihood of finding a superior alternative (Fiore et al., 2005) and can be considered as the usefulness of the website. In addition, hedonic shopping value reflects shopping's potential entertainment and emotional worth (Babin et al., 1994). From previous discusses and due to the importance of experiential value of the game service, we replace the constructs for TAM with the two constructs for experiential values, that is, utilitarian and hedonic values, in Devaraj et al.'s theoretical framework and propose a modified model as presented in Fig. 1 to test the associations among the constructs in an online game environment.

3.2. Antecedents of online game satisfaction

Previous studies considered that overall satisfaction is primarily a function of perceived service quality (Cronin & Taylor, 1992; Parasuraman, Zeithaml, & Berry, 1988) and service quality is strongly related to online satisfaction (Loh & Ong, 1998; Rodgers et al., 2005; Tsai, Huang, Jaw, & Chen, 2006). Recent researches have included additional constructs as the antecedents of customer satisfaction in the online satisfaction and loyalty model (Devaraj et al., 2002; Yang & Peterson, 2004). In addition to the set of constructs suggested by the technology acceptance model (TAM), the constructs used in the transaction-cost approach (TRC) (Williamson, 1975, 1987), that is, perceived ease of use, time efficiency, and price savings, the three dimensions have been used to measure different aspects of the efficiency of online transactions and explained a large portion of customer satisfaction with Internet-based services (Devaraj et al., 2002).

The five dimensions of SERVQUAL: tangibility, reliability, responsiveness, assurance, and empathy, for assessing service quality, have been adapted to evaluate information system (IS) service quality recently and prior studies also indicated that SERVQUAL is appropriate for measuring IS service quality (Kettinger & Lee, 1994; Pitt, Watson, & Kavan, 1995; Watson, Pitt, & Kavan, 1998; Xie & Wang, 1998; Liu & Arnett, 2000; Devaraj et al., 2002; Wang & Tang, 2003). For measuring customer-perceived service quality of websites, Wang and Tang (2003) refined and validated the current SERVQUAL and IS-SERVQUAL instruments and the results indicated that the tangibility dimension is less relevant to the e-commerce service quality and completely excluded from the model. We follow the conclusion and use four dimensions: reliability, responsiveness, empathy, and assurance of online channel in this study (Devaraj et al., 2002; Wang & Tang, 2003).

There is little research that validated the factors anteceding to online satisfaction (Rodgers et al., 2005). When only considering quality as the antecedent of online satisfaction, the findings indicate that the path coefficients from system quality and service quality to online satisfaction are significantly positive (Rodgers et al., 2005). When integrating the metrics of TRC, TAM, and SERVQUAL in a model, the results reveal that TAM and TRC dominate the impact on satisfaction (Devaraj et al., 2002). When replacing TAM with website technology (WEBST) in the integrated model, the results show that the standardized path coefficients from WEBST, TRC, and SERVQUAL to online satisfaction are all positively significant (Yang & Lin, 2006).

Based on the foregoing review of the relationships between the online satisfaction and the constructs from experiential value, transaction cost, and SERVQUAL, we suggest that the following hypotheses can be posited in an online game service context:

H1: Online game satisfaction (ONL_SAT) will be positively affected by experiential value (EXP_V).
H2: Online game satisfaction (ONL_SAT) will be positively affected by transaction cost (TRA_C).
H3: Online game satisfaction (ONL_SAT) will be positively affected by service quality (SEV_Q).

3.3. Online game satisfaction and loyalty

In recent marketing research, the measures of perceived quality, satisfaction, and loyalty on behalf of customers have been used to assess firm's productivity and its marketing performance (Cortinas, Elorz, & Villanueva, 2004). Consumer satisfaction has been the subject of much attention in the literature because of its potential influence on consumer behavioral intention and customer retention (Cronin et al., 2000). Similarly, in a B2C channel satisfaction model, customer satisfaction is considered as an important construct because it affects participants' motivation to stay with the channel (Devaraj et al., 2002). Consumer loyalty and satisfaction are linked inextricably (Oliver, 1999) and customer satisfaction positively affects
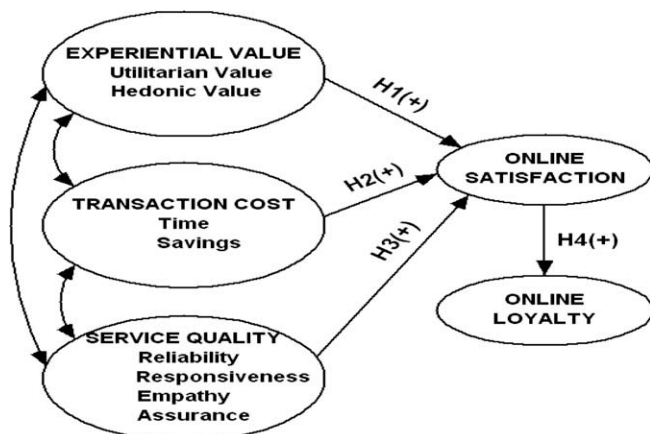

Fig. 1. The intergrated conceptual model and hypotheses.

loyalty (Oliver, 1999; Zeithaml, Berry, & Parasuraman, 1996). Satisfaction with a product or service offered has been identified as a key determinant for loyalty (Skogland & Siguaw, 2004). This relationship would seem to be applicable to Internet e-commerce (Reichheld, Markey, & Hopton, 2000). Past studies found that online customer loyalty results from customer's satisfaction with the EC channel and that the positive impact of online satisfaction on loyalty is evidenced in the context of electronic commerce (Bhattacherjee, 2001; Hoffman, Novak, & Peralta, 1999; Devaraj et al., 2002; Yoon, 2002; Anderson & Srinivasan, 2003; Rodgers et al., 2005). From the review of the past research, it is presumable that high online game satisfaction will yield high online game intentions and loyalty. Therefore, the following research hypothesis will be tested:

H4: Online game satisfaction (ONL_SAT) will have a positive impact on online game loyalty (ONL_LOY).

3.4. Online game satisfaction as mediator

Combining the constructs discussed above, we proposed the online game satisfaction and loyalty model, presented in Fig. 1, including constructs from experiential value, TRC, and SERVQUAL with the hypotheses of this study on the paths. According to the model, experiential value, transaction cost, and service quality, the three antecedents influence on online game satisfaction, which, in turn, affects online game loyalty. In this model, online game satisfaction is a function of the three antecedents operating in a situation and helps to explain the influence of the antecedents on online loyalty. Although, it has attracted researchers to pay attention to the formal tests of the mediation effects (e.g., Gelade & Young, 2005; Yang & Lin, 2006), but, to our knowledge, rare research examines the mediating effects of customer satisfaction in an integrated loyalty model or behavioral intentions model, much less formally tests that of online game satisfaction in the online game service environment. Therefore the mediating effects of online game satisfaction when the mediational model involves latent constructs will be tested formally and the following hypothesis is posited:

H5: Online game satisfaction (ONL_SAT) will mediate the effects of the antecedents (EXP_V, TRA_C, and SEV_Q) on the online game loyalty (ONL_LOY).

4. Method and results

4.1. Measurement and sample

To adequately build the constructs for testing our hypotheses, we performed a comprehensive review of the literature. From this review, we borrowed and adapted valid multiple-scales existed, we developed measures using a framework proposed by DeVellis (1991). To test the hypotheses this study relied on five sets of constructs and

their indicators. All indicators came from the items in an online survey questionnaire designed with a 7-point Likert scale from strongly disagree (1) to strongly agree (7). The items that were validated in prior studies were used with minor wording modification to apply to an online game service context (e.g., Parasuraman et al., 1988; Devaraj et al., 2002; Park & Kim, 2003; Srinivasan, Anderson, & Ponnavolu, 2002; Fiore et al., 2005).

Experience value was defined as the perception which game players gained in the past process playing. This construct is divided into two dimensions, utilitarian value and hedonic value. Utilitarian value is defined as the best choices which do by "logical evaluation" reference to games' efficiency and content. Hedonic value is defined that to find fun, fantasy, arousal, sensory stimulation, and enjoyment is the interest for the people. We adapted the scale for experience value (EXP_V) from Fiore et al. (2005). EXP_V was conceptualized as a second-order model of two subconstructs, which were assessed by utilitarian value (util) and hedonic value (hedo). They have three items (ut1–ut3) and six items (hd1–hd6) in questionnaire used to measure the two constructs, respectively.

Defined transaction cost was defined as the total cost game players spent enjoy playing including time efficiency and price saving. Time saving is defined as the time customers spend in the whole shopping process at the online game firm. Price saving is defined as the online game firm can offer lower price of products and services. We adapted the scale for transaction cost (TRA_C) from Devaraj et al. (2002). Similarly, TRA_C was assessed by two subconstructs: time efficiency (time) measured by three items (tm1–tm3) and price savings (savg) by four items (sv1–sv4).

Service quality was defined as the perceptions game players felt when they played including reliability, responsiveness, assurance, and empathy. Reliability is defined as the online game firm can serve the tasks correctly and reliably. Responsiveness is defined as the online game firm can satisfy customers' needs and offer services on time. Assurance is defined as the ability online game firm can offer enough knowledge and let customers felling trust and confidence. Empathy is defined as the online game firm can identify the customer and offer personal services. We adapted the scale for service quality (SEV_Q) from Parasuraman et al. (1985, 1988) and Devaraj et al. (2002). The SEV_Q was assessed by four subconstructs: reliability (reli), responsiveness (resp), assurance (assu), and empathy (empa) of the online game service and they were assessed by three (rl1–rl3), four (rp1–rp4), two (as1–as2), and three (em1–em3) items in questionnaire, respectively. The three second-order constructs are latent exogenous variables and allowed to intercorrelate each other in the model.

Online satisfaction was defined as the satisfaction which is an ex post evaluation of consumers' experience with the services and products. We adapted the scale for online satisfaction (ONL_SAT) from Devaraj et al. (2002). ONL_SAT was a first-order model of one construct and measured by four items (os1–os4). We defined online

loyalty as the online game players want to use online shopping rather than other online game firm after online game playing. We adapted the scale for online loyalty (ONL_LOY) from Srinivasan et al. (2002). Similarly, ONL_LOY has five items (ol1–ol5). The two first-order constructs are latent endogenous variables in the model.

To examine the associations among the constructs and test the hypotheses mentioned above, an online survey questionnaire was established on a survey portal provided by Chunghwa Telecom and we posted the survey message on two main online game players' BBSes in Taiwan, where the interesting players can connect the portal and complete the survey. SPSS 14.0 and AMOS 6.0 procedures were used to analyze the data. Since outliers often have dramatic effects on the fitted model, we identify outlying observations first. Out of the 894 responses, 17 cases identified from multivariate perspective with the Mahalanobis D^2 measure as significantly different ($D^2/\mathrm{df} > 3.5$) were eliminated (Hair, Black, Babin, Anderson, & Tatham, 2006) and we obtained a total 877 usable questionnaires for analysis. The participants included 35.4% business workers and 58.2% students. Among them 72.1% males, about 90.3% less than 30 years of age, 8.8% between 31 and 40 years of age, and only 0.9% above 40 and 63.5% having at least a college degree. The responses to the hours spending in the Internet were as follows: less than 10 h a week (28.4%), 10–20 h (16.9%), 20–30 h (14.1%), 30–40 h (12.2%), 40–50 h (6.5%), and more than 50 h (21.9%).

The maximum likelihood method, used in this study, can be employed for the data with minor deviations from normality (Wisner, 2003), even when the data deviate moderately from a normal distribution if the model has been correctly specified (Chou & Bentler, 1995; West, Finch, & Curran, 1995). Consequently, a simple check of normality, i.e., a Q–Q plot for each variable used in the model, was conducted and the data appeared to be approximately normally distributed. Besides, the univariate skewness and kurtosis for all items in the sample were checked and they were ranging from −1.34 (hd2) to 0.009 (em2) for skewness and −1.22 (rp2) to 0.84 (hd2) for kurtosis, within the maximum limits of an absolute value of two for skewness and seven for kurtosis recommended by West et al. (1995). Besides, we checked the multicollinearity when a total of 28 indicators for independent variables and 9 indicators for dependent variables in the questionnaire were analyzed together in the model. The results indicated that the variance of inflation factors (VIFs) for indicator variables rp1, rp2, and rp3 were 10.8, 11.7, and 12.1 respectively, which exceed a little higher than the recommended threshold of 10 (Kline, 2005; Kutner, Nachtsheim, Neter, & Li, 2005). However, we decided to keep the variables in the proposed model for it is more consistent with the constructs having the same variables proposed by the existing literature (e.g., Rodgers et al., 2005).

Exploratory factor analysis procedure was used to test the potential common variance in survey research (Devaraj et al., 2002; Boyer & Hult, 2005). The results did not show a single factor structure that explained a majority of the covariance, suggesting that common method variance is not a threat to the analysis and interpretation of the data.

4.2. Construct validation and reliability

Although the items used as the indicators to measure the constructs in this study were based on the related literature review, the tests of convergent validity, discriminant validity, and reliability were important for establishing construct validity (Ahire, Golhar, & Walter, 1996; Tu, Vonderembse, & Ragu-Nathan, 2001). Anderson and Gerbing's (1988) recommendations were followed first in evaluating and refining the measurement model prior to the simultaneous estimation of the measurement and structural models. Then, confirmatory factor analysis (CFA) was used to check construct validity of the measurement model, combining the five constructs with more precise test (Byrne, 1998). Using AMOS 6.0, the measurement model was assessed and refined according to the modification indices allowing five pairs of error terms to have non-zero covariance. The common used goodness of fit indices such as $\chi^2/\mathrm{df} = 4.53$, goodness of fit (GFI) = 0.842, adjusted goodness of fit (AGFI) = 0.809, Bentler's comparative fit index (CFI) = 0.951, and RMSEA = 0.063, met the generally recommended threshold levels, showed that the overall measurement model appeared to fit the data reasonably. The results revealed that all standardized factor loadings were statistically significant and each individual indicator's coefficient was from 0.662 (em3) to 0.958 (tm3), all p's < 0.000 and greater than twice its standard error. The composite reliability values, weighted by factor loadings, ranged from 0.67 (hedo) to 0.85 (resp), all but one exceeded the often used practical lower level of 0.70, indicating an acceptable internal consistency for each construct. (Nunnally & Bernstein, 1994; Hair et al., 2006). The variance-extracted estimates, ranging from 0.61 (hedo) to 0.84 (resp), exceeded the 0.50 lower limit (Fornell & Larcker, 1981; Hair et al., 2006). All the three evidences supported the convergent validity of the items as measures of their respective underlying constructs. In addition, discriminant validity was assessed by using the confidence interval constructed around the pairwise correlation between any two constructs in the measurement model. The results showed that all confidence intervals did not contain the value of 1.0, indicating the existence of discriminant validity among the constructs. (Anderson & Gerbing, 1988). The results of the CFA model suggested a high statistical measurement quality associated with the ten constructs.

4.3. Results of analysis

4.3.1. Test of the overall model

Having assessed the overall measurement model, the proposed integrated conceptual model, including five research constructs (three second order exogenous constructs: EXP_V, TRA_C, and SEV_Q and two first order

endogenous constructs: ONL_SAT and ONL_LOY) and path coefficients were tested by using structural equation modeling (SEM). Using AMOS 6.0, the model fit indices (χ^2/df = 4.01, GFI = 0.845, CFI = 0.955, and RMSEA = 0.059 met the recommended threshold levels) suggested that the proposed model fitted the collected data. The hypothesized relationships were tested using their associated t-values. Fig. 2 shows the estimated path coefficients of the model and the squared multiple coefficients (SMC, in bigger font size), which provide the estimates of variance explained. Hypotheses H1–H3 predicted that three antecedents – EXP_V, TRA_C, and SEV_Q – positively affect ONL_SAT. The results showed that the standardized path coefficients from EXP_V, TRA_C, and SEV_Q to ONL_SAT were 0.060 (SE = 0.035, t = 1.714, p < 0.10), 0.252 (SE = 0.065, t = 3.877, p < 0.000), and 0.676 (SE = 0.045, t = 15.022, p < 0.000), respectively. The squared multiple coefficient for ONL_SAT was 0.86, meaning a large portion of the variation in ONL_SAT was accounted for by the three antecedents. Hypotheses H1–H3 were supported. In addition, hypothesis H4 examined the impact of ONL_SAT on ONL_LOY. As shown in Fig. 2, ONL_SAT was found to influence ONL_LOY significantly (b = 0.919, t = 102, p < 0.000), and 85% of the variation in ONL_LOY was explained by ONL_SAT (SMC = 0.85).

4.3.2. Tests on mediating effect of online game satisfaction

In this study we suggested that ONL_SAT will mediate the effects of the antecedents on ONL_LOY (H5). Kenny's four steps are widely employed to test the mediating effect using three separate estimated regression equations regardless which data analytic method was used. However, when latent variables were included in the model, the mediation analysis would be done by a structural equation modeling program (Kenny, 2006), because the measures and tests of indirect effect can address mediation more directly than a series of separate significance tests not directly involving the indirect effect in the mediation model (Preacher & Hayes, 2004). The amount of mediation of one initial variable (e.g., EXP_V, an antecedent of the mediator ONL_

Table 1
The total, direct, and indirect effects

Effects of:	Exogenenous variables			
on	SEV_Q	TRA_C	EXP_V	OL_SAT
ONL_SAT				
a, b	0.689	0.236	0.067	
SE	0.045	0.066	0.035	
t_Value	15.311[**]	3.576[**]	1.914[*]	
ONL_LOY				
a	0.575	0.293	0.033	0.990
SE	0.054	0.078	0.042	0.080
t_Value	10.648[**]	3.756[**]	0.786	12.375[**]
b	−0.109	0.059	−0.034	0.990
SE	0.071	0.068	0.030	0.080
t_Value	−1.535	0.868	−1.133	12.375[**]
c	0.684	0.234	0.066	
SE	0.074	0.069	0.035	
t_Value	9.243[**]	3.391[**]	1.886[*]	

a: Total effect; b: direct effect; c: indirect effect.
[*] p < 0.10.
[**] p < 0.001. SE: standard error.

SAT) can be estimated by the indirect effect of the initial variable when adding the path from the initial variable to the so-called outcome variable (i.e., ONL_LOY), while controlling the mediator and the other initial variables (e.g., TRA_C and SEV_Q) as covariates in the mediation model (Kenny, 2006). In the mediation model, if the total effect of the initial variable is significant meaning that there is an effect that can be mediated. In addition, if the direct effect is (not) significant, the mediator has a (complete) partial mediating effect on the relationship between the initial variable and the outcome variable.

Using AMOS 6.0 with 3000 bootstrapping samples to assess the total, direct, and indirect effects with standard errors as given in Table 1, the results showed that the indirect effect of EXP_V was 0.066 with t = 1.886, p < 0.10, meaning that ONL_SAT weakly mediated the effect of EXP_V on ONL_LOY. On the other hand, the indirect effects of TRA_C and SEV_Q were 0.234 (t = 3.391, p < 0.001) and 0.684 (t = 9.243, p < 0.001), respectively, demonstrating that ONL_SAT strongly mediated the effect of TRA_C and SEV_Q on ONL_LOY. The H5 was supported, that is, online satisfaction fully mediated the effects of experiential value, transaction cost, and service quality on online loyalty.

5. Discussion

5.1. Theoretical implications

As mentioned above, the three antecedents are important features affecting online game satisfaction. Moreover, when checking the loadings of the dimensions of their corresponding constructs, we find that all loadings are significant (p < 0.00) and above 0.78 (see Fig. 2), indicating
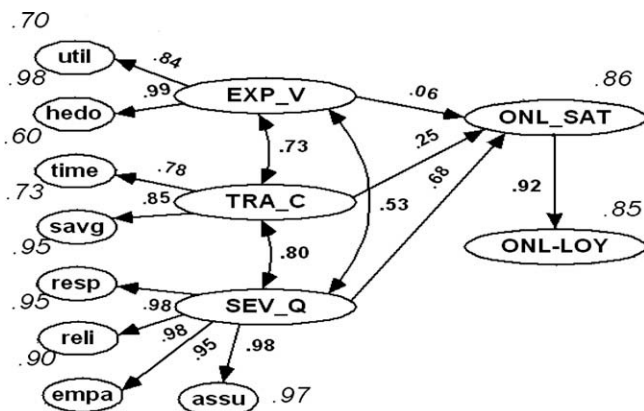

Fig. 2. The estimated parameters of the integrated model.

the important dimensions that the online game players may concern most. Furthermore, the online game players' loyalty is highly related to online game satisfaction and that, at same time, is significantly affected by transaction cost and service quality significant at $p < 0.001$ and by experiential value significant at $p < 0.10$. The results imply that the three antecedents are important factors that influent online loyalty. However, the degree of importance is different. First, service quality is the most important factor affecting online game satisfaction for having largest total effect on online loyalty (0.622, $p < 0.000$). Furthermore, the standardized factor loadings of the four dimensions of service quality are almost equal and significant at $p < 0.000$, implying that service quality indeed produce online loyalty in the first place. Second, Transaction cost is the second important factor with total effect on online game satisfaction (0.232, $p < 0.001$). However, the standardized factor loadings for its two dimensions are different. The price savings dimension (savg) (0.84, $p < 0.000$) have been paid more attention by online players than time efficiency (time) (0.78, $p < 0.000$). Finally, the total effect of experiential value is 0.055 ($t = 1.719$, $p < 0.10$) and far smaller than that of the other two. However, in this case, the online game players seem pay more emphasis on hedonic value (hedo) than utilitarian value (util).

5.2. Managerial implications

That online game satisfaction has been significantly and strongly direct effected on online loyalty and has completely mediated the relationships between the three antecedents and online loyalty, indicating that online game satisfaction serves an important role in the proposed model. The results imply that how to manage (1) the experiential value, especially, the hedonic value by providing more challengeable tasks (hd1) and more new skills (hd2) in the game, (2) shorter transaction time and more acceptable price of product and service, and (3) better service quality with online game service are the key factors for effectively increasing online game satisfaction in order to enhance and retain players' loyalty.

Consumer behavior researchers have documented the vital role of customer satisfaction in a variety of customer behavior model. However, even though in online service literature, online satisfaction model have received considerable attention from scholars and practitioners, the integrated model and empirical studies containing mediation effect in online service environment, especially in online game service environment, is little. With empirical data and formally statistical test we verified that the proposed online game satisfaction and loyalty model is acceptable and found that online game satisfaction completely mediates the effects of experiential value, transaction cost, and service quality on online loyalty. The findings constitute a contribution to, and extension of, the literature in online game behavior and online game service management

and the mediating role of online game satisfaction in an integrated model as well.

Although our findings provide meaningful implications for online game providers, there are some limitations of this study which should be addressed in the future. First, there are other important antecedents of online game satisfaction, not included in this study, such as information quality and system quality, in addition to service quality, being considered in an online satisfaction and loyalty model (Rodgers et al., 2005). Second, whether including the tangibility dimension in service quality is inconsistent in online service research. Empirical evidence shows that the items for tangibility dimension have been examined and completely excluded in an EC-SERVQUAL instrument study because of low SMC (Wang & Tang, 2003). However, in an online satisfaction study evidence indicates that tangibility is a significant dimension of service quality (Rodgers et al., 2005). For further research, it is worthwhile including them in the model. Besides, trust, commitment, switching barriers, and others have been considered as important mediators in online shopping and online-purchase decisions model (Yoon, 2002; Park & Kim, 2003; Tsai et al., 2006), but not included in this study. Further studies may consider an integrated online loyalty model with multiple antecedents of online satisfaction and multiple mediators, and formally test the mediating effects of the mediators to understand consumers' online game behavior and the differential effect of these antecedents and mediators.

6. Conclusions

From the analysis result and exploration of this study, we hope it can give a help and advice to online game manager or the operator who want to join this online game industry. First, service quality of online game firm is the key factor to affect customer satisfaction; transaction cost is the second one, and the last is experience value. Today in online game environment, there are no different among user interfaces of any online game firm, which can't offer differentiation to increase customer satisfaction for the online game. It also indicates the technology approach maturity and operator must be carefully investment in technology.

The most important factor that affects customer satisfaction is service quality of online game firm, which includes reliability, responsiveness, assurance, and empathy. When online store reliably and correctly complete promised services; offer and satisfy customer needs on time; let consumer trust with professional knowledge; offer personal service to consumer; then it can increase consumer satisfaction effectively. The findings imply that how to manage online game service quality better, provide more acceptable transaction cost, and offer more experiential value are the key ways for effectively enhancing players' satisfaction with the online game service in order to retain their loyalty to the online game service system.

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