# The Influence of Perceived Value of Online Game Users on their Participation in Value Co-creation Behavior

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**Abstract:** Online games have gradually become a form of entertainment and a pastime for many people. In recent years, the growth rate of China's online game industry has slowed, game users have entered the storage area, and the game industry has entered a stable development stage. More and more game enterprises need to rely on multiple parties to participate in value co-creation to integrate and build game brand value and gain advantages in the industry competition. Based on Perceived Value theory and Value Co-creation theory, this paper constructs a theoretical model of online game users' Value Co-creation Behavior, analyzes the mediating role of Brand Relationship Quality between Perceived Value and Value Co-creation Behavior, and the moderating role of Game Literacy. The study found that Self Fulfillment and Social-emotional Development had significant effects on Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior. In contrast, Character Experience and Recreational Release significantly affected Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior. Brand Relationship Quality mediates between Perceived Value and Value Co-creation Behavior; Game Literacy mediates between Perceived Value and Value Co-creation Behavior. The moderating effect of Game Literacy in the relationship between Perceived Value and Value Co-creation Behavior is not significant. The above study results have important reference significance for the development of online games.

## 1. Introduction

Benefiting from technological advances and the expansion of the size of Internet users, China's online game industry has maintained a high growth rate every year in the past few years. However, compared to the 37.7% year-on-year growth in 2014 and 22.9% year-on-year growth in 2015, the market size of the online game industry only grew by 7.7% in 2019 [1]. With the disappearance of the demographic dividend, Chinese online game users have entered the stock interval, and the game industry has entered a stable development stage. The epidemic has provided new opportunities for the development of online games. In the first quarter of 2020, leading Chinese game companies such as Tencent, Netease, and San7 Interactive Entertainment all achieved growth in online game revenue, with an average growth rate of 30% [2]. During this period, new features also emerged in the online game industry: demand for games increased, and user behaviour was mainly driven by social. And after three years of the epidemic, players' overall enthusiasm for entertainment returned to normal, with gaming habits still present but with a higher demand for game quality. In this period, the competition of game platforms will also return to the refined operation of game IP.

In order to retain users, create high-quality game products and gain advantages in the industry competition,

more and more game enterprises need to rely on multiple parties to participate in value co-creation to integrate and build game brand value. In this phenomenon, the main position of game users is very obvious. They actively participate in the game development and innovation process and are willing to share and spread their game experience, gradually transforming from passive receivers to passive recipients to active participants, disseminators, and creators [3]. What is the catalyst for user participation in game brand value co-creation? There have been many academic discussions on this issue, such as taking online game virtual communities as the research object and exploring the path of consumers' participation in brand value co-creation in communities from the perspective of social networks [4]; or taking game brands [5] or game digital distribution platforms [6] as the core to study the mechanism of game value co-creation. However, in previous studies, the influence of users' perceptions and attitudes towards the game product itself on value co-creation has been neglected. Such as the users' feelings about playing, the audio and visual stimuli they feel in the game, and the related links they have with the game brand after playing deeply. Does this paper pose the question: can game companies increase the quality of the relationship between users and game brands by improving the quality of their perception of the game product itself? Can such emotional attitudes

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further promote users' participation in the Value Co-creation Behaviour?

Based on this, this paper combines Perceived Value Theory and Value Co-creation Theory to explore the influence mechanism and path of users' perceived quality on Value Co-creation Behavior from the perspective of users' perception of online game products. Through literature collation and empirical research, we hope to achieve the following objectives: from the perspective of users' Perceived Value, clarifying the process of Value Co-creation Behavior can enable game brands to recognize the influencing factors behind users' participation in Value Co-creation Behavior, and better find the focus points for game products to improve quality and stimulate users' value perception, which is important for This is important for game companies to retain users, build a good brand relationship and promote better user participation in brand value co-creation, which can create more business value for the companies. At the same time, in the context of value co-creation theory, game users are not only passive recipients of the brand's value output but can also create value together with the company. Hence, value co-creation is a win-win initiative for both users and brands. This paper's results can provide some suggestions to game enterprises regarding game production upgrading and game IP refinement operation, which is also conducive to improving users' gaming experience. In addition, this paper constructs a theoretical model of the influence of game users' Perceived Value on Value Co-creation Behavior, explores the influence of different dimensions of users' Perceived Value of message products on their participation in Value Co-creation Behavior, and argues for the mediating role of Brand Relationship Quality in it. The study's results will also be an important element of value co-creation theory in online games.

## 2. Literature review

### 2.1. Perceived Value

The idea of Customer Perceived Value can be traced back to 1954. Drucker proposed in Management Practice that what customers buy and consume is not a product but a value [7]. With the expansion of the concept of customer value in the marketing field, its connotation and dimensional theoretical models have also been developing. There are commonly four-dimensional and five-dimensional models, etc. Perceived value is the subjective feeling of customers towards the product, which is obviously influenced by subjective factors. Different customers perceive the value of the same commodity differently. And for online games, due to the unique virtual nature and Park and Lee focus on virtual goods in online games and propose four dimensions of measurement: fun value, character ability value, visual dominance value, and monetary value [8]. Based on the characteristics of customer value hierarchy and experience economy, Yu, Ping, and Sang classified the Perceived Value of online games into four dimensions: Self Fulfillment, Social-emotional Development,

Character Experience Development, and Recreational Release into four dimensions [9]. Ouyang Banghong and Liu Chen et al. divided the Perceived Value of game players into four dimensions: fun value, character ability value, visual management value, and monetary value [10]. Based on Yu Ping and Sang Wentian's view, this paper divides consumers' Perceived Value of online games into four dimensions Self Fulfillment, Social-emotional Development, Character Experience Development, and Recreational Release; the study was conducted.

In the most research literature, Perceived Value has been studied as an independent or mediating variable. Many scholars have demonstrated that Perceived Value positively impacts customers' emotions and behaviors. Zhang Qiyao and Zheng Aicheng used night market customers as the research object. They introduced customer emotion as a mediating variable to argue that Perceived Value has a significant positive impact on the willingness to consume in night markets [11]. Users perceive Self Fulfillment, Social-emotional Development, Character Experience Development, and Recreational Release values in online games as important factors in brand relationship building, and in the process of deeper game user experience Brand Relationship Quality gets a boost. Based on their love for the game brand, customers are willing to participate in activities initiated by the game brand and share the game experience with others, maintaining the brand relationship over time and creating value together. In this paper, we explore the effect of different dimensions of Perceived Value on Brand Relationship Quality and different types of Value Co-creation Behaviour.

### 2.2. Brand Relationship Quality

The primary purpose of the game is to gain a gaming experience. As the player's gameplay deepens, i.e., the interaction between the consumer and the brand deepens, further emotional connections are made to the game brand, and a brand relationship is formed. As for game brands, since the content of this study is conducted with the online game players' perception of the game product itself as the core, the game brands in the study refer to the brands of the game products and services themselves rather than the brands of the developers, operators or publishers of the games. For example, 'Food Language' is a game brand, and the developer of 'Food Language', Guangzhou Tianti Network Technology Company Limited, and the publisher, Tencent Games, are not game brands.

Blackston was the first to propose the concept of brand relationships, pointing out that the quality of interaction between consumers and the brand mainly influences brand relationships. Through many brand analyses, he concluded that successful interaction consists of customer trust and brand satisfaction [12]. Fournier first identified Brand Relationship Quality as a measure of brand relationships and proposed that Brand Relationship Quality consists of six components: love and passion, self-connection, interdependence, personal

commitment, intimacy, and the companionship quality of the brand [13]. Through empirical research, Zhou Zhimin and Lu Taihong found that Brand Relationship Quality can be divided into five dimensions: commitment relevance, attribution concern, familiarity and understanding, trust and respect, and association re-identification [14]. Zhao Jinglin and Zhao Hong and Zhang Tuixi have pointed out that although there is no consensus among academics on the Brand Relationship Quality dimensions [15,16]. Most studies include the three dimensions of brand satisfaction, brand trust, and brand commitment, with brand trust and commitment being a deeper level of brand relationship than customer satisfaction. Trust implies that consumers have reliability and honesty in the brand Trust means that consumers have confidence in the reliability and honesty of the brand. In contrast, commitment means consumers are willing to maintain a long-term relationship with the brand. This paper uses brand satisfaction, trust, and commitment as dimensions of Brand Relationship Quality to test the subsequent research hypotheses.

Empirical studies have demonstrated that consumer perceptions significantly positively impact Brand Relationship Quality and that Brand Relationship Quality positively impacts customer behaviour. In a study on tourism brands, Zhang Hui and Chen Ye demonstrated that brand fit significantly impacts all dimensions of Brand Relationship Quality [17]. This paper combines the characteristics of online games. It explores the influence of the Perceived Value of game users on Brand Relationship Quality and the effect of Brand Relationship Quality on Value Co-creation Behavior from the user's game experience.

## 2.3. Game Literacy

Game Literacy is a broad concept that refers to the skills of knowing, using, experiencing, and effectively constructing games correctly and appropriately. According to Zhang Qianwei, Game Literacy consists of five aspects: game knowledge, game rules, game skills, game motivation, and game emotion [18]. Gou Chaoqun pointed out that Game Literacy mainly consists of three parts: game emotion, game rules, game awareness, and game skills and creative ability [19]. Although scholars have different dimensions of Game Literacy, it can be concluded that Game Literacy combines players' game emotions, consciousness, and skills. This requires players to have a good and healthy state of mind to feel the fun of the game, to be able to appreciate and comprehend the music, plot, and graphics, and to understand and abide by the game's rules. In addition, players need to have certain operating skills and cognitive levels, reflected in the operation level of players in competitive games or the ability to make plans and strategies in strategic games. Players with certain gaming skills can think creatively and critically about the game, recreate it, or propose changes.

This paper focuses on the impact of users' Perceived Value on their participation in Value Co-creation Behaviour. Game Literacy may affect their ability to play the game successfully and their experience and ability to co-create value. Suppose users have a low level of knowledge and experience in games. In that case, they can easily become frustrated in games, resulting in their inability to perceive game content properly, develop a positive feeling towards game brands, and communicate about game products or suggest corrections.

## 2.4. Value Co-creation

Prahalad and Ramaswany were the first to propose the concept of value co-creation, suggesting that firms can co-create value with consumers through interactive behaviours, which can help firms gain an edge over their competitors [20]. Wu and Chen divide value co-creation theory into value co-creation based on producer logic and value co-creation based on consumer logic. This refers to firms investing and integrating consumer resources to improve their value output, and consumers are integrating resources to create value or solve problems for themselves, respectively [21]. Pinho, Beirao et al. point out that the mobile Internet's development has made value co-creation more diverse and complex, with consumers, companies, suppliers, and collaborators all being able to participate in value co-creation [22]. Ultimately, value co-creation is an interactive and cooperative process in which stakeholders integrate multiple resources to create value for multiple parties. Specifically, in the game field, He Yuanshuo believes that value co-creation theory has strong applicability in the game field. Multiple resources in the upstream and downstream of the game industry chain can achieve resource integration through the interaction of multiple actors, in which game users play a very important role [5].

Scholars have also researched the dimensional division of Value Co-creation Behavior. Most scholars divide it into Customer Engagement Behaviour and Customer Citizenship Behaviour (Yi and Gong [23], Chen Ying and Ren Lejing et al. [24]) based on previous studies, which further explain Customer Engagement Behaviour and Citizenship Behaviour from the perspective of Value Co-creation. Zwass and Chaohui Li and Yongsheng Jin et al. argue that Value Co-creation Behavior can be divided into two types [25,26]. Namely, Sponsored Value Co-creation Behavior and Autonomous Value Co-creation Behavior, depending on the initiator. Ranjan and Read distinguish three types of value-creation behavior: co-production, use of value, and knowledge sharing [27]. Based on Zwass' view, this study distinguishes the Value Co-creation Behavior of game users according to the subject. It divides it into corporate Sponsored Value Co-creation Behavior and consumer Autonomous Value Co-creation Behavior.

Empirical studies have shown that consumers' characteristics and Perceived Value influence Value Co-creation Behavior. Wei Qinggangdemonstrated a positive correlation between consumer-perceived fairness and perceived risk and consumer participation in Value Co-creation Behavior[28]. This paper notes that consumers' Perceived Value of online games helps build

positive brand relationships and gives game users positive attitudes toward game brands. Based on this good feeling, users are willing to participate in the value co-creation of game brands. In this process, users' good or bad Game Literacy may affect their Value Co-creation Behavior, and users' Game Literacy may affect their Value Co-creation Behaviour. Based on this, this study constructs a model based on the "awareness-attitude-behavior" relationship theory. The relationship between Perceived Value, Brand Relationship Quality, Game Literacy, and Value Co-creation Behavior of online game users are studied.

# 3. RESEARCH MODEL AND RESEARCH HYPOTHESIS

Based on the "Awareness-Attitude-Behaviour" theory, this study takes the Perceived Value of game users in the game process as the basis of awareness and through the Brand Relationship Quality. This represents the attitude, and under the moderating effect of Game Literacy, affects the participation of game users in the game brand. The concept model of the relationship between Perceived Value, Brand Relationship Quality, and Value Co-creation Behavior of game users is thus constructed, as shown in Figure 1.
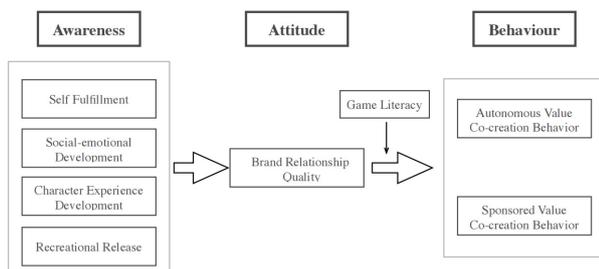


**Fig.1.** Concept model (Photo credit: Original)

## 3.1. The relationship between Perceived Value and Value Co-creation Behaviour

Perception is the basis of all mental activity. Numerous studies have proven that Perceived Value is an important influencing factor for consumers' participation in Value Co-creation Behavior. Tang Jing and Xu Yahan [29] have demonstrated that the perceived economic impact of tourism and the perceived environmental impact of tourism significantly and positively influence the Value Co-creation Behavior of tourism destination residents, as well as the mediating role of subjective well-being. For online games, when game players form subjective evaluations of various aspects of the game after understanding the game content and experiencing the game fun in the game process, good brand perceptions can improve customer satisfaction at a certain level, which in turn promotes their participation in brand value co-creation activities.

Based on this, this paper proposes the following hypothesis:

H1a: Self Fulfillment positively influences Autonomous Value Co-creation Behaviour.
H1b: Social-emotional Development positively influences Autonomous Value Co-creation Behaviour.
H1c: Character Experience Development positively influences Autonomous Value Co-creation Behaviour.
H1d: Recreational Release development positively influences Autonomous Value Co-creation Behaviour.
H1e: Self Fulfillment positively influences Sponsored Value Co-creation Behaviour.
H1f: Social-emotional Development positively influences Sponsored Value Co-creation Behaviour.
H1g: Character experience development positively influences Sponsored Value Co-creation Behaviour.
H1h: Recreational Release development positively influences Sponsored Value Co-creation Behaviour.

## 3.2. The relationship between Perceived Value and Brand Relationship Quality

Customer Perceived Value is an important antecedent for customers to build goodwill toward a brand. A study by Yang Shuang and Zhou Xing on SNS users concluded that multiple Perceived Values of SNS users significantly affect relationship quality dimensions such as satisfaction, trust, and commitment [30,31]. Zhenquan Sha and Meixian He et al. empirically demonstrated that customer Perceived Value and positive customer sentiment significantly impacted Brand Relationship Quality [32]. When online game users play games, they gain multi-dimensional perceptual experiences in the virtual world of the Internet, including various aspects of the game, such as story content, audio, visual stimulation, and friendship fun. In this process, game users can feel the cultural connotation of the game brand from the worldview built by the game and feel the production technology of the game brand from the production of the game graphics, etc. Good Perceived Value can trigger game users' good feelings towards the game brand, thus establishing a good brand relationship. However, no research has yet provided a detailed answer to how each perceived dimension of online games affects Brand Relationship Quality.

Based on this, this paper proposes the following hypothesis:

H2a: Self Fulfillment positively influences Brand Relationship Quality.
H2b: Social-emotional Development positively influences Brand Relationship Quality.
H2c: Character Experience Development positively influences Brand Relationship Quality.
H2d: Recreational Release positively influences Brand Relationship Quality.

## 3.3. The relationship between Brand Relationship Quality and Value Co-creation Behaviour

Numerous studies have shown that the brand relationship is a two-way loyalty between customers and the brand and that consumers' post-purchase behaviour results

from high levels of Brand Relationship Quality. Zhang Xinsheng and Li Xianguo empirically demonstrated that Brand Relationship Quality, which focuses on satisfaction and trust, has a positive impact on consumers' willingness to participate in value co-creation and that when consumers have a higher level of satisfaction and trust in a brand's virtual community. In addition, they are more likely to favour the brand and thus develop positive post-purchase behaviors such as participating in the brand's product improvement activities [33]. Playing a game is also a process of deeper communication between the user and the game brand, and as the game progresses, the user builds a positive brand relationship with the game brand. According to reciprocity theory, in return for a quality brand relationship, game users will also reciprocate to game users, as shown by their willingness to give feedback to the game brand on their own gaming experience and suggestions for improvement or share their gaming experience with friends and other Value Co-creation Behaviour, expecting their behaviour to bring positive effects to the game brand.

Based on this, this paper proposes the following hypothesis:

H3a: Brand Relationship Quality positively influences Autonomous Value Co-creation Behavior behaviour.

H3b: Brand Relationship Quality positively influences Sponsored Value Co-creation Behavior.

### 3.4. The Mediating Role of Brand Relationship Quality

In their study on virtual brand communities, Xiong Aihua and Chen Xiaoyun confirmed that Brand Relationship Quality partially mediates the influence of Perceived Value on Value Co-creation Behavior [34]. Based on Hypothesis 2 and 3, this paper proposes the following hypothesis to test this mediating role.

H4: Brand Relationship Quality mediates the relationship between Perceived Value and Value Co-creation Behavior.

### 3.5. The Moderating Role of Game Literacy

Game Literacy is an important factor influencing how players experience and perceive game content. Players with better Game Literacy can quickly acquire game skills, have a sharper perception of game content, and share more feelings and experiences with other players. This provides more effective suggestions for game improvement and even can recreate game content.

Based on this, this paper proposes the following hypothesis:

H5: Game Literacy positively moderates the relationship between online game users' Perceived Value and their participation in Value Co-creation Behavior.

## 4. RESEARCH DESIGN

### 4.1. Questionnaire design

This study used the questionnaire method to conduct an empirical study. The questionnaire design was divided into two parts: the first part consisted of basic information about the respondents, including gender, age, education, and the frequency of participation in online games; the second part measured the variables involved in the model. The variables were measured on a five-point Richter scale, ranging from "very unlikely" to "very likely". The variables used were based on scales published in refereed journals and adapted to the purpose of the study to form the initial questionnaire. To ensure that the questionnaire was more appropriate to the context of the respondents, the English and Chinese scales were repeatedly revised. Then 10 in-depth online game players were invited to fill in the questionnaire and propose changes to form the final scale.

Specifically: (1) In terms of game user perceptions, this study adopted Yu Ping and Sang Wentian's [9] scale, which divides consumers' Perceived Value of online games into Self Fulfillment, Social-emotional Development, Character Experience Development, and (2) In terms of Brand Relationship Quality, this study draws on the scales of Hu Yinhua and He Yan [35] and Xiong Aihua and Chen Xiaoyun [34] to measure brand satisfaction, brand trust and brand commitment as the dimensions of Brand Relationship Quality; (3) In terms of game In terms of Literacy, this study refers to Gou Chaoqun's [19] study and Shi Rui's and Han Donglin's [36] scales to measure Game Literacy in three dimensions: Game Emotion, Game Awareness, and Game Skills; (4) Value Co-creation Behavior, this study refers to Swass' [25] and Jiang Ying's [37], the Value Co-creation Behavior of game users was divided into corporate Sponsored Value Co-creation Behavior and game users' Autonomous Value Co-creation Behavior for measurement.

### 4.2. Data collection

This study took online game users as the research object and distributed questionnaires through the "Questionnaire Star" platform and diffused questionnaires through various online game communities. A total of 305 questionnaires were collected online, and 197 were valid after excluding invalid questionnaires that were not online game players, had too short a response time, and had too many common options—the sample description for analysis through SPSS23.0 software. From the sample structure, 140 respondents had participated in online games for more than two years, accounting for 72.2% of the survey population, indicating that most of the sample were deep online game players. Their perceived experiences and behaviours better reflected the overall characteristics of online game players, and the overall representativeness of the sample was good.

# 5. DATA ANALYSIS AND HYPOTHESIS TESTS

## 5.1. Reliability and validity tests

This study used SPSS 23.0 and AMOS 21.0 software to test the reliability and validity of the scale. The Cronbach's alpha coefficient was used to analyze the questionnaire data, and the results showed that Cronbach's alpha value of each scale variable was greater than 0.75 (Table 1), indicating that the question items of this questionnaire were reliable. The reliability of the scale was good. The results of the KMO and Bartlett's spherical tests conducted on the scale showed that the KMO value for the overall sample of this study was 0.931, with a p-value infinitely close to 0 (Table 2), which reached a significant level. The KMO value was greater than 0.6, indicating that this study was suitable for factor analysis. The validation factor analysis of the seven variables involved in the study yielded Std. Estimate greater than 0.65 for each variable of the scale, indicating good aggregation of the overall model. Ave values were greater than 0.5, and combined reliability CR was greater than 0.75, indicating that the scale has good internal consistency and convergent validity.

**Table 1.** Results of confirmatory factor analysis

| Construct | | Survey Items | Std. Estimate |
|---|---|---|---|
| Self Fulfillment<br><br>Cronbach's Alpha=0.848<br>AVE=0.593<br>CR=0.853 | SF1 | I can achieve self-fulfillment by accomplishing various goals in the game. | 0.823 |
| | SF2 | My efforts could be easily recognized by friends around me in the game. | 0.842 |
| | SF3 | I can experience the thrill of competing with others through my game characters. | 0.705 |
| | SF4 | I use the game as a resource to improve my strengths and hobbies. | 0.699 |
| Social-emotional Development<br><br>Cronbach's Alpha=0.892<br>AVE=0.623<br>CR=0.892 | SED1 | I enjoy interacting with other players and having fun in the game. | 0.787 |
| | SED2 | I can meet many friends in the game and they bring me happiness. | 0.831 |
| | SED3 | I love being involved in different types of activities in the game. | 0.783 |
| | SED4 | I love teamwork and fighting with my partners in the game. | 0.731 |
| | SED5 | Friends can give me care, assistance and comfort in the game. | 0.81 |
| Character Experience Development<br><br>Cronbach's Alpha=0.874<br>AVE=0.649<br>CR=0.88 | CED1 | I can experience a different life from the real one through my role in the game. | 0.84 |
| | CED2 | I run the characters in the game and experience the satisfaction of character growth. | 0.785 |
| | CED3 | I always discover new things and enjoy trying them out through the game. | 0.884 |
| | CED4 | Through the game, I can improve my intelligence, emotion and courage. | 0.703 |
| Recreational Release<br><br>Cronbach's Alpha=0.870<br>AVE=0.626<br>CR=0.869 | RR1 | I think playing online games is a form of entertainment. | 0.723 |
| | RR2 | Through the game, I can pass the boring time and make my life more fulfilling. | 0.855 |
| | RR3 | Through the game, I can release my stress and frustration. | 0.759 |
| | RR4 | Through the game, I can feel the excitement and the pleasure. | 0.82 |
| Brand Relationship Quality<br><br>Cronbach's Alpha=0.885<br>AVE=0.667<br>CR=0.889 | BRQ1 | I am satisfied with the service provided by the online game. | 0.815 |
| | BRQ2 | The actual performance of the online game meets my expectations. | 0.833 |
| | BRQ3 | I am proud to be a member of the online game players. | 0.881 |
| | BRQ4 | I would like to continue playing online games. | 0.732 |
| Game Literacy<br><br>Cronbach's Alpha=0.751<br>AVE=0.521<br>CR=0.764 | GL1 | I often stay positive in the game. | 0.77 |
| | GL2 | I can understand and follow the rules of the game. | 0.737 |
| | GL3 | I have good handling skills during the game. | 0.654 |
| Autonomous Value Co-creation Behavior | AVCB1 | I often take the initiative to share and exchange my game experience with others. | 0.759 |

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|---|---|---|---|
| Cronbach's Alpha=0.880 AVE=0.65 CR=0.881 | AVCB2 | I often post about gaming topics on the Internet. | 0.81 |
| | AVCB3 | I actively like and comment on internet topics about online games. | 0.85 |
| | AVCB4 | I am willing to help others with problems related to online games. | 0.803 |
| Sponsored Value Co-creation Behavior Cronbach's Alpha=0.917 AVE=0.745 CR=0.921 | SVCB1 | I often volunteer to fill in feedback questionnaires published by game brands. | 0.821 |
| | SVCB2 | I am actively involved in the creative competition organized by game brands. | 0.949 |
| | SVCB3 | I actively participate in game promotion activities, such as participating in official online prize draw activities or offline events. | 0.887 |
| | SVCB4 | I often watch the official tournaments of the game | 0.786 |

**Table 2.** KMO and Bartlett's Test

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | 0.931 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 4848.888 |
| | df | 496 |
| | Sig. | .000 |

## 5.2. Correlation test

This study conducted Pearson correlation analysis on each dimension of Perceived Value, Brand Relationship Quality, and Value Co-creation Behavior of online game users using SPSS23.0 software. As shown in Table 3, the four dimensions of the Perceived Value of online game users were significantly and positively correlated with Brand Relationship Quality (p<0.01), the four dimensions of Perceived Value of online game users were significantly and positively correlated with two dimensions of Value Co-creation Behavior (p<0.01), and the four dimensions of Brand Relationship Quality was significantly and positively correlated with two dimensions of Value Co-creation Behavior (p<0.01). The correlations of the above variables are in line with the research model and provide a basis for further analysis in this study.

**Table 3.** Correlations

| | SF | SED | CED | RR | BRQ | GL | AVCB | SVCB |
|---|---|---|---|---|---|---|---|---|
| SF | 1 | | | | | | | |
| SED | .582** | 1 | | | | | | |
| CED | .644** | .624** | 1 | | | | | |
| RR | .516** | .447** | .661** | 1 | | | | |
| BRQ | .569** | .473** | .620** | .641** | 1 | | | |
| GL | .572** | .551** | .628** | .658** | .685** | 1 | | |
| AVCB | .515** | .539** | .523** | .434** | .655** | .591** | 1 | |
| SVCB | .417** | .466** | .334** | .208** | .527** | .429** | .773** | 1 |

** Correlation is significant at the 0.01 level (2-tailed).

## 5.3. Hypothesis testing

### 5.3.1. Main effects analysis

This study used AMOS 21.0 software to construct a structural equation model to test the main effects. The structural equation model CMIN/DF == 2.105, RMSEA = 0.071, GFI = 0.799, CFI, NFI, IFI are all greater than 0.9, and the model fit is good. Analysis of the test data for each pathway (see Table 4) revealed that Character Experience Development (p=0.112>0.05; p=0.933>0.05) and Recreational Release (p=0.164>0.05; p=0.317>0.05) had a positive effect on Autonomous Social-emotional Development (p=0.402>0.05) on Brand Relationship Quality did not show a significant path. Therefore hypotheses H1b, H1d, H1g, and H1h were invalid. Significance and therefore hypothesis H2b does not hold. The rest of the paths were significant at the 0.05 level. Self Fulfillment (p=0.012<0.05; p=0.004<0.05) and Social-emotional Development (p=0<0.05; p=0<0.05) significantly affected Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior, hypotheses H1a, H1b, H1e, and H1f hold; Self Fulfillment (p=0.002<0.05), Character Experience Development (p=0.015<0.05), and Recreational Release (p=0.0< 0.05) significantly affect Brand Relationship Quality, hypotheses H2a, H2c and H2d hold; Brand Relationship Quality (p=0.0<0.05; p=0.0<0.05) significantly affects Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior, hypotheses H3a and H3b hold.

**Table 4.** Hypotheses test results

| | Impact pathway | SE | CR | p | Standardized Coefficients Beta | |
|---|---|---|---|---|---|---|
| H1a | SF→AVCB | 0.087 | 2.57 | 0.012 | 0.2 | valid |
| H1b | SED→AVCB | 0.069 | 3.761 | 0 | 0.284 | valid |
| H1c | CED→AVCB | 0.099 | 1.619 | 0.112 | 0.146 | not valid |
| H1d | RR→AVCB | 0.102 | 1.413 | 0.164 | 0.107 | not valid |
| H1e | SF→SVCB | 0.102 | 2.918 | 0.004 | 0.249 | valid |
| H1f | SED→SVCB | 0.08 | 4.262 | 0 | 0.352 | valid |
| H1g | CED→SVCB | 0.127 | 0.084 | 0.933 | 0.008 | not valid |
| H1h | RR→SVCB | 0.117 | -1.001 | 0.317 | -0.083 | not valid |
| H2a | SF→BRQ | 0.064 | 3.114 | 0.002 | 0.215 | valid |
| H2b | SED→BRQ | 0.05 | 0.851 | 0.402 | 0.057 | not valid |
| H2c | CED→BRQ | 0.08 | 2.481 | 0.015 | 0.199 | valid |
| H2d | RR→BRQ | 0.074 | 5.558 | 0 | 0.373 | valid |
| H3a | BRQ→AVCB | 0.064 | 12.183 | 0 | 0.655 | valid |
| H3b | BRQ→SVCB | 0.077 | 8.711 | 0 | 0.527 | valid |

### 5.3.2. Mediating effect test

As both Perceived Value and Value Co-creation Behavior of online game users are multi-dimensional variables, here, Perceived Value and Value Co-creation Behavior of online game users are used as overall variables to test the mediating nature of Brand Relationship Quality. This study used the process plug-in in SPSS software to conduct a mediation effect test using Bootstrap hair, selecting a sample size of 5000 and model 4, with a confidence interval set at 95%, and analyzing the mediation effect based on whether the upper and lower bounds of the confidence interval contained 0 between them. The test results showed (Table 5) that the total effect of the Perceived Value of online game users on Value Co-creation Behavior was 0.733, with a 95% confidence interval of [0.192, 0.141] excluding 0. The comprehensive analysis concluded that Brand Relationship Quality significantly affected the relationship between Perceived Value and Value Co-creation Behavior. Co-creation Behavior has a partially mediating role between Perceived Value and Value Co-creation Behavior, and hypothesis H4 holds.

**Table 5.** Mediating affect test results

| | Effect | Boot SE | p | 95% Boot CI |
|---|---|---|---|---|
| Perceived Value=>Brand Relationship Quality=>Value Co-creation Behavior | 0.733** | 0.057 | 0.00 | 0.192 ∼ 0.414 |

### 5.3.3. Reconciliation effect test

Model 1 includes the independent variable Perceived value and five control variables, including Gender, Age, Educational qualifications, Length of participation in online games, and the Average number of hours of online game participation per day; Model 2 adds the moderator Game Literacy to Model 1, and Model 3 adds the interaction term (the product of the independent and moderator variables) to Model 2. Model 1 is to investigate the effect of the independent variable, Perceived Value, on the dependent variable, Value Co-creation Behavior, when the moderating variable, Game Literacy, is not taken into account. As seen from Table 6, the independent variable Perceived Value showed significance (t=8.401, p=0.000<0.05), which means that Perceived Value has a significant relationship with Value Co-creation Behavior. The moderating effect can be viewed in two ways and the first is to view the significance of the change in F-value when going from model 2 to model 3; the second is to view the significance of the interaction term in model 3, this time, the moderating effect is analyzed in a second way. From the table above, it can be seen that the interaction term between Perceived Value and Game Literacy does not show significance (t=-0.037, p=0.970>0.05), as well as from model 1, X produces an impact relationship for Y, implying that Perceived Value has an impact on Value Co-creation Behavior when moderating variable Game Literacy remains consistent across levels, suggesting that the moderating effect of Game Literacy is not significant. Hypothesis H5 does not hold

**Table 6.** Reconciliation affects test results

| | Model1 | Model2 | Model3 |
|---|---|---|---|
| Perceived Value | 0.677** (8.401) | 0.427** (3.837) | 0.427** (3.823) |
| Game Literacy | | 0.467** (3.189) | 0.466** (3.168) |
| Perceived Value*Game Literacy | | | -0.001 (-0.037) |
| R 2 | 0.371 | 0.404 | 0.404 |

|  | Model1 | Model2 | Model3 |
|---|---|---|---|
| Adjusted R 2 | 0.352 | 0.381 | 0.378 |
| F | F(6,190)=18.7 13,p=0.000 | F(7,189)=18.2 66,p=0.000 | F(8,188)=15.8 99,p=0.000 |
| △R 2 | 0.371 | 0.032 | 0.000 |
| △F | F(6,190)=18.7 13,p=0.000 | F(1,189)=10.1 70,p=0.002 | F(1,188)=0.00 1,p=0.970 |

\* $p<0.05$ \*\* $p<0.01$; t values are in parentheses

# 6. CONCLUSION

## 6.1. Main conclusions

Based on consumer perceived value theory and value co-creation theory, this paper constructs a theoretical model of the influence of game users' Perceived Value on Value Co-creation Behavior, analyzes the mediating role of Brand Relationship Quality and the moderating role of Game Literacy, and draws the following conclusions after empirical research.

First, the Perceived Value of game users significantly influences Value Co-creation Behavior. Regarding the specifics of each dimension, Self Fulfillment and Social-emotional Development have a significant impact on Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior. The effects of Character Experience and Recreational Release on Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior were insignificant. In contrast, the effects of Character Experience and Recreational Release on Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior were insignificant. This suggests that the different aspects of perceptions that game users form during the game have different degrees of influence on their participation in brand value co-creation behaviour. Game users place more importance on the sense of achievement and self-esteem felt in the game and the good interpersonal relationships and sense of belonging built up during the game, both of which bring more obvious pleasurable stimuli. In contrast, character development is the basic content of online games and the basic value experience of the game for entertainment and leisure players, both of which bring less stimulation to players and thus have a limited effect on user behaviour.

Second, Brand Relationship Quality significantly influences Autonomous Value Co-creation Behavior and Sponsored Value Co-creation Behavior, suggesting that in the process of playing games, users build positive brand relationships with game brands and that this positive attitude influences their own behaviour, prompting them to do things that create value for the game brand, such as sharing This positive attitude influences the users' own behaviour, prompting them to take actions that create value for the game brand, such as sharing their gaming experience or actively engaging with the game brand.

Third, Self Fulfillment, Character Experience Development, and Recreational Release significantly impact Brand Relationship Quality. In contrast, Social-emotional Development does not significantly impact Brand Relationship Quality. This suggests that the sense of achievement, character immersion, and recreational release that players perceive in the game can increase their satisfaction with the game brand. As they progress through the game, this satisfaction will further deepen into trust and commitment, enhancing the quality of the brand relationship to a higher degree. In contrast, players' experience of social interaction in games is mainly reflected in emotional interaction with others and has no significant impact on players' good feelings towards the game brand.

Finally, The moderating effect of Game Literacy in the relationship between Perceived Value and Value Co-creation Behavior is not significant, which is contrary to the original hypothesis of this study. Considering the actual situation, the reason may be that online games are a popular and universal entertainment item that does not require high operating skills, and even people who lack gaming experience Even those who lack experience in the game can have fun in the process of exploring new games.

## 6.2. Countermeasures

From the perspective of value co-creation theory, consumers are the value co-creators of a company or brand. Therefore, the findings of this paper will not only help game companies to create better game products but also help game users to build up a positive perception of the game brand and to participate in value co-creation behaviour, as well as to facilitate game users to experience the game and to participate in value co-creation activities of the game brand.

Increasing the perceived value of the game to the game user. The positive perceived value of a game product can lead to a positive feeling of loyalty and engagement with the game brand. Game companies can consider adding more diverse value realization paths so different players can feel self-fulfillment in the game. At the same time, game enterprises need to make the game have richer interactive gameplay so that players can more obviously feel the care and recognition among partners in the game. At the same time, the quality of the game product itself is also very important. Excellent game works can give players a better sense of character immersion and immersive experience, and better feel the pleasure of the game.

When gamers find common interests and points of interest with other gamers, they are more likely to initiate value co-creation behaviour on their own. Therefore, when promoting their products, game companies can also seek channels to build bridges

between consumers, such as running a good online community for games or a branded community app, so that there is a good environment and atmosphere for players to communicate. In addition, game companies also need to launch more different types of co-creation activities so that players have more channels to contact the game brand and make the activities more interesting and fun to increase the willingness of game users to participate. In this process, the power of players gives game brands a stronger influence. Game brands integrate players' opinions to continuously improve the formation of game products, which can give consumers a better gaming experience.

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