

Peacocks or Eagles: Analyzing Factors Influencing Gamers' Purchase Intentions in Online Free-to-Play Games Through Social Identity Theory

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ABSTRACT

The Otaku economy has become a focus of attention owing to Covid-19, and online gamers can chat, make friends, and keep in touch through games to enhance their feelings. Most players have only experienced free content games, as practitioners often use free game software plus game accessory sales to attract consumers. Moreover, the cognition of games and mall props will affect gamers' purchase intention. Targeting massively online free games, this research analyzes consumer behavior in the society of online free games by using variables like network exposure, social interaction design, and network convergence. This research distributed questionnaires through online gaming unions and online communities to identify the factors influencing gamers' purchase intention of equipment and apparel. According to the research results, factors like network exposure, social interaction design, and network convergence will influence the willingness to purchase achievement and vanity props in large-scale online free games. Hence, gamers can be divided into two categories: (1) the vanity type (peacock), who likes gorgeous apparel and will use online games to create his perfect images in mind through characters that differ from his true self. (2) the feature type (eagle) aims to improve the effects and efficiency of tasks to obtain self-identification in games through purchasing props. These insights offer valuable guidance for game developers and marketing professionals in designing targeted monetization strategies and user engagement mechanisms.

Keywords: online free games, network convergence, vanity, purchase intention

I. INTRODUCTION

The era of the free online game industry has come, and it's the most important topic for practitioners to make profits. Gamers creating virtual characters in games were considered as self-reflection in reality (Vorderer et al., 2003). In the global gaming market, gamers can chat, make friends, and keep in touch through games to enhance their feelings. Online social networking plays an important role in the spread of most free online games, providing gamers with social gaming and creating real-life experiences for gamers, such as organizing meetings, recharging and purchasing game props, etc. The development of mobile Internet and technological, social network significantly reduced communication costs among users to make communication more convenient (Muller and Peres, 2019), blurring the boundary between virtual and real social life. As online games push gamers to share joys and sorrows in the game, their decisions in the game will also be affected by online social networks (Kim et al., 2019).

Recently, as the Otaku economy developed owing to Covid-19, Newzoo's data analytics show that the total revenue generated by the global gaming market from 2020 to 2022 is approximately \$43 billion higher than the pre-pandemic estimate. In 2020, mobile games became more social. By 2021, the global number of online gamers has reached 3 billion (Esports, 2021). According to the report from Entertainment Software Association, 56% of regular gamers engage in multiplayer games and spend an average of seven hours per week chatting with other gamers online. 55% of gamers believe that community games help them keep in touch with others during Covid-19. In a competitive environment of online games, the network connection between gamers will generate social pressure directly (Hsu and Lu, 2004). Therefore, gamers can affect online games at the social level, which determines their beliefs and attitudes in return (Granovetter, 1978).

When gamers are making breakthroughs or playing the game, what consumer behavior can drive them to purchase the game equipment is an important issue for game developers. Due to free downloads, in-game accessories have become the main source of revenue for practitioners. Based on previous literature, gamers' cognition of games and mall props will directly or indirectly affect gamers' purchase intention (Kuo et al., 2009). Moreover, the contents and quality of games are important factors that affect gamers' purchases, and gamers can demonstrate unique character capabilities and features (Guo and Barnes, 2007). Furthermore, hedonism and feature are both concepts in online games, which aim to bring happiness by finishing tasks (O'Shaughnessy and O'Shaughnessy, 2002). Besides the happiness brought by completing tasks, gamers will also experience social happiness through network communities (Jones, 2003). Therefore, this study is interested in understanding whether friends, teammates, or competitors around gamers in a virtual society exhibit their own devices and styles to satisfy social vanity and whether such vanity increases gamers' intention to purchase equipment and apparel. Moreover, this study hopes to investigate whether such perfect social networks relation and vanity can increase gamers' intention to purchase equipment and apparel. In this way, some practical suggestions can be made for the future developers of free online games.

This study aims to bridge the knowledge gaps identified in previous research, particularly in the realm of how gaming fosters an identity centered around goal attainment (feature achievement) and the vanity items. This aspect remains under-explored in existing literature. Wang (2022) investigated the formation of a gamer's

connection with a game, considering their pursuit of accomplishments and engagement as a leisure activity. However, a detailed examination of these driving factors, such as the quest for success or the use of games as a pastime, was not sufficiently addressed. In contrast, Chang (2020) focused on understanding gamers' cognitive and emotional identification with gaming and its impact on their active participation. It has been empirically observed that gamers are often motivated by the desire to attain goals and the gratification derived from showcasing their achievements within the gaming context. This tendency is likely shaped by the social dynamics and the environment inherent in the gaming experience.

Based on all the above, this paper raised the following question:

Do online social interactions and social identity among free gamers affect their attitudes towards completing tasks and showing off?

To address the question posed, this study begins by developing a research model based on Social Identity Theory (SIT). SIT serves as the theoretical foundation, identifying two types of identities: those focused on achievement and those centered around vanity features. This is in line with the essence of SIT, which emphasizes that individuals categorize themselves and others into various social categories. Identification with these groups then becomes a source of pride and self-esteem (Tajfel et al., 1979). Therefore, individuals categorized under the achievement feature attain self-esteem by accomplishing challenges in games, while those identified with vanity achieve pride through maintaining an aesthetic appearance during gameplay. These identities are shaped by social network mechanisms and interactions within the game environment. Consequently, this research identifies network exposure as a factor influencing the design of social interactions (Caponnetto et al., 2021). In turn, these social interactions support network convergence (De Freitas and Griffiths, 2008), leading individuals to identify with specific categories. Ultimately, the study examines the impact of these mechanisms on behavioral intentions in the gaming environment, such as the intention to purchase. The ultimate goal is to further understand gamers' intentions to purchase virtual goods, whether identified with achievement or vanity features. Moreover, this study extends the application of Social Identity Theory beyond traditional offline contexts by incorporating dual identity types—achievement-oriented and vanity-driven—into the virtual environment of online gaming. These identities not only reflect in-game behaviors but also parallel broader consumer behavior patterns found in fashion, brand communities, and status-driven consumption in real-world settings. In summary, the study posits that individuals pursuing achievement or 'show off' the vanity items are more likely to purchase virtual goods. This, in turn, offers practical and theoretical contributions, which will be discussed in subsequent parts of this research.

II. LITERATURE REVIEW

A. Related Works and Gaps Identification

Table 1 presents the related works and gaps identification. Identifying findings from previous studies and their relevance to social identity in gaming environments provides insights that reinforce the position of the current research within the existing literature.

There is a limited body of research that identifies vanity and achievement features based on previous studies. For example, Chuang (2020) focused on identifying cognitive and affective identities in relation to game engagement. The results demonstrate that gamers' behavioral engagement is influenced by psychological engagement, which in turn shapes their social identity in cognitive and affective terms. Indeed, this research centers on behavioral engagement as the outcome variable. While Wang (2022) investigated the influence of achievement-seeking use of games on game identification, that study did not explore how such identification impacts the purchase of virtual products in games. Moreover, aspects of network exposure, social interaction design, and network convergence have not been fully integrated into a comprehensive study and are considered mechanisms in forming the identity of vanity and achievement features (see Liao et al., 2020; Mäntymäki and Islam, 2014; Jakobsson, 2006). These gaps are what this research aims to explore, building upon the findings of previous studies.

Building on the core principles of SIT, this study posits that identities centered on achievement and vanity contribute to forming behavioral intentions, such as purchasing virtual goods. A significant aspect of this research is to clarify how social identity is shaped by the game environment. This starts with identifying network exposure, which allows players to be introduced to and experience social networks within the gaming environment (Mäntymäki and Islam, 2014). This includes the frequency and intensity of interactions with other players, exposure to in-game social features, and the visibility of achievements to others. The study aims to test the hypothesis that network exposure, in the process of shaping identity, can influence players' sense of vanity and achievement by providing constant information and a sense of accomplishment, which in turn motivates players to seek similar recognition and status.

This study will also employ social interaction design to facilitate and shape interactions among players. This includes communication tools, cooperative and competitive elements, community features, and other in-game mechanisms that enable players to connect and interact with each other. The concept of network convergence will also be explored as the blending of players' in-game identities with their real-world identities (Liao et al., 2023). Achievements and acquisitions in the game become part of how they are perceived in real life, potentially increasing the value placed on vanity and achievement in the game. Ultimately, vanity and achievement features will be driven as identity groups within games, leading players to focus on individual goals that eventually become their source of self-esteem in playing games. As an outcome variable, this study will examine the overall impact on the purchasing intention of virtual goods to support the reinforcement of players' identities in the game environment.

Table 1
Related Works and GAPs Identification

Author(s)	Network Exposure	Social Interaction Design	Network Convergence	Identity		Theory	Findings
				Feature Achievement	Vanity		
Wang (2022)	No	No	No	Yes (Achievement-seeking use)	No (Passing time Motivation use)	Social Identity Theory	Gamers prefer games that are engaging, fair, and easy to use, recommending them more often. Those aiming to achieve goals enjoy the competitive nature, while casual players like the uniqueness and simplicity.
Chuang (2020)	No	No	No	No (Cognitive Identity)	No (Affective Identity)	Social Identity Theory	Behavioral engagement is influenced by psychological engagement, itself determined by cognitive and affective social identity, along with a sense of social and virtual presence. Psychological engagement acts as a vital link, essential for any subsequent behavioral engagement.
Liao et al. (2020)	No	No	Yes	No	No	Weak/Strong tie theory	The findings delineate a positive correlation between network convergence, interdependence, and the complex nature of gamer-game relationships, including their length, depth, and breadth. These dimensions of the gamer-game relationship are instrumental in cultivating online gamer loyalty.
This study	Yes	Yes	Yes	Yes	Yes	Social Identity Theory	The study suggests that network exposure, social interaction design, and network convergence affect purchases of in-game items for status or performance. Gamers fall into two groups: those seeking to enhance their image with aesthetic items and those looking to boost task performance through purchases. These dynamics are crucial for understanding in-game consumer behavior.

B. Hypothesis Development

1. Network Exposure

Network exposure measures the direct contact between individuals and networks at a specific time. Covering the social influence of gamers and their perception of stress, network exposure weighs the social influence of gamers in the game (Venkatesh and Brown, 2001). At the same time, personal experience sharing or daily apparel can affect other gamers through recommendations and movies. Online games are the most suitable option to be “the third place” for informal social interaction (Oldenburg, 1999; Steinkuehler and Williams, 2006), where gamers can make friends with others to maintain social connections. As large competitive games allow gamers to play simultaneously, the presence and attention of gamers enhance their interaction in the game (Charlton and Danforth, 2007).

2. Social Interaction Design

After analyzing the cooperation mode of online games, Nardi and Harris (2006) found that online games promoted offline social contact through group activities. When there is a union, gamers will play different roles in it, like leaders, lurkers, and contributors, which determine the status, tasks, and functions of gamers in return (Ang and Zaphiris, 2010). Roles in the union enhance the social interaction of gamers and also improve the efficiency of making breakthroughs in games (Ang, 2011; Strijbos et al., 2003). About 79% of gamers will join the union in large competitive games (Yee, 2002). At the same time, the union hopes its members will keep their promise and be responsible, which will encourage gamers to engage in the game more frequently (Ducheneaut et al., 2006; Williams et al., 2006). The key goal of the game is to achieve interdependence, so the gamers can better enjoy the benefit of cooperation (Kerr, 2008; Taylor, 2006). Gamers who show interdependence often emphasize group harmony. Individuals with similar personalities or social backgrounds will gather together (Markus and Kitayama, 1991; Setterstrom et al., 2018; Singelis, 1994) and establish social connections through playing the game (Maurer et al., 2016).

Maurer et al. (2016) revealed the importance of social connections in game networks, and the relationships between gamers were proved to impose a significant impact on the experience. Hence, related scholars have proposed different ways to classify those variables, like emotional networks (Morrison, 2002), advice networks, friendship networks, and trust networks (Krackhardt, 1992). According to the relation classification by Krackhardt (1992) and Morrison (2002), this study divides the network relation into three types: (1) advice network, being consulted or consulting others in work; (2) Friendship network: friendly exchanges between members; (3) Emotion network: members trust each other. In terms of studies on online games, social contact and network convergence were regarded as vital factors in virtual society (Teng, 2015; Tseng et al., 2015), and social contact can measure how close gamers are. Research suggests that the higher network exposure, the stronger gamers’ social contact in games. Hence, the following hypotheses were put forward:

H1: Network exposure will positively affect social interaction design.

3. Network Convergence

In the online game union, gamers can participate in specific unions and interact with other gamers to realize self-identification (Cheung and Lee, 2010), which will enhance the contact between gamers and social interaction (Shen and Chiou, 2009; Uysal, 2016). Achieve the goal of games through group cooperation (Lee et al., 2021; Liao et al., 2020a). Sociologists believe that society is a complex large system (Parsons and Shils, 1951). Previous studies about games usually discussed the interdependence and network convergence among gamers (Huang et al., 2018; Parks and Floyd, 1996), while in current research, network convergence was used in fields of games or gambling (Gainsbury et al., 2016).

The Internet is what connects the global network (Dizard Jr, 2021; Elmer-DeWitt, 1995), forming the new “collaborative mass media forms” (Rafaeli and LaRose, 1993). Moreover, it brings relationships and mass communication while blurring the traditional boundary between interpersonal relationships and mass communication (Lea and Spears, 1995; Williams and Rice, 1983). In studies that explored the relationship between cyberspace and interpersonal relationships, network convergence is considered to be the degree to which gamers share friends with other co-partners (Parks et al., 1995; Parks and Eggert, 1991; Parks and Floyd, 1996). Cooperation can not only help gamers to understand the game contents and accumulate knowledge but also can win the emotional support of other gamers. (Liao et al., 2020b; Morschheuser et al., 2017). The process of cooperation can enhance the social experience of gamers (Pham et al., 2023). In a system of diffusion equivalence, there is no need to seek direct benefits of specific equivalence but rather to believe that long-term cooperative behavior can be rewarded (Keohane, 1986). In the virtual world, gamers will influence each other and increase their intention to purchase. According to this study, the closer social contact is the more obvious network convergence. Therefore, the following hypotheses were raised:

H2: Social interaction design will positively affect network convergence.

4. Feature Achievement

The feature props were commonly classified into personalized props, auxiliary props, convenience props, augment props and tool props. Similar to physical goods, virtual goods are purchased by people for different reasons. Feature virtual goods are employed to add new attributes to the game-playing methods themselves. For instance, feature virtual goods may include powerful weapons, armor, and other enhanced items to increase role attributes or game advantages (Hamari and Keronen, 2017b). For example, in games like League of Legends, players often purchase items such as "Infinity Edge" or "Rabadon's Deathcap" to boost attack damage or magical power—these are typical feature props that directly enhance performance and increase win rates. Gamers will feel more satisfied by using feature virtual goods to break the levels in games (Dholakia, 1999; Li et al., 2015), like earning coins, awards, or making new records (Lepper et al., 1973). Breaking levels will enhance the intention of gamers to continue the game and express self-identification (Han et al., 2007). In multiplayer online games, gamers consider achievement as a task in the achievement system (reward system) (Jakobsson, 2011), while the goal itself is described as a task allocated to gamers in the achievement system

(Hamari and Eranti, 2011). Therefore, in this study, feature props can not only explain the functions of products to the gamers but also help the gamers experience a sense of achievement by breaking levels in games, so the phenomenon is named “Feature Achievement”. Consumer behavior of feature gamers is described as activity, task relevance, and rationality (Babin et al., 1994). As gamers can experience the happiness of breaking levels in games by utilizing feature goods, they can further realize self-identification. Therefore, this study believes that for gamers to achieve tasks together, the higher the network convergence, the more likely it is to affect their intention to purchase feature virtual goods in the game. The following hypotheses are proposed:

H3: Network convergence will positively influence the feature achievement

5. Vanity

Vanity virtual props are not able to affect the game and are essentially useless game-playing methods (Rodríguez, 2017). In the virtual world, gamers can make use of roles and props to act on their desired characters and experience personalized roles (Klimmt and Vorderer, 2003). The process not only has social values (Holbrook and Hirschman, 1982) but also can be used as an extended self (Belk, 2014; Lemmens et al., 2011). In the studies of hedonic consumption, Hirschman (1983) classified imaginative experiences into fantasy, escapism, and role reflection. In this way, gamers can imagine the things or situations they want (Hirschman and Holbrook, 1982). However, online games should represent a big and realistic virtual world where gamers can feel safe and relaxed and evade their responsibilities with their fantasies attached to them (Chen et al., 2016; Dormans, 2006). Just like in real life, promotion in a virtual environment aims to enhance gamers' intention to consume by launching various promotional activities at different festivals. Jang et al. (2021) have confirmed that gamers' intention to purchase can be improved through business models such as free gifts or promotional activities. In regards to product design, regardless of feature or apparel props, they must be practical and exquisite with features and uniqueness (Lin and Sun, 2007). Gamers can get rid of reality by playing online games, showcasing, and presenting their perfect images in the game to obtain and achieve ostentatious pleasure; that's how the phenomenon of "vanity" comes. For instance, in games like Fortnite or PUBG, players often spend real money to purchase limited-edition character skins, colorful costumes, or animated emotes that do not affect gameplay performance but allow them to stand out visually in social settings. This study believes that for gamers to present their perfect egos and show off to other gamers, the higher the network convergence, the more likely it will affect gamers' intention to purchase virtual vanity props in the game. The following hypotheses are raised:

H4: Network convergence will positively influence the vanity

6. Virtual Goods

It's a business model for game developers and social networks to purchase virtual goods in games (Alha et al., 2014; Hamari et al., 2017; Hamari and Lehdonvirta, 2010; Lehdonvirta and Castronova, 2014; Nieborg, 2015). Additionally, many online free games rely on this business model to make revenue (Hamari and Keronen, 2017a).

Sharing the same attributes as physical goods, virtual goods are not only competitive but also have social values. Furthermore, virtual goods can even replace physical goods (Lehdonvirta, 2009), and gamers reject others using the same virtual goods (Fairfield, 2005). Past studies on games Lin and Sun (2007) divided virtual goods into feature goods and decorative goods. The former can improve the attack ability of gamers, and the latter can change the decoration of apparel. However, Gamer (2009) believed that online game virtual goods can be classified into three types, namely vanity props (to be used for decoration), feature props (to have different functions), and social props (gamers can send gifts to others). Based on the above literature, this study categorizes the types of virtual goods into two types: feature props that can assist gamers in breaking levels in games; vanity goods used by gamers to showcase their perfect images through games and obtain ostentatious enjoyment finally.

7. The Intention of Gamers to Purchase Virtual Props

Virtual props can support gamers to play or can meet aesthetic and social demands like physical goods in the real world (Hamari and Lehdonvirta, 2010). Online games can bring gamers a sense of enjoyment, pleasure, and fun (Hollebeek et al., 2022), while completing in-game tasks through feature products can help gamers gain social status and rewards, such as experience points, prizes or upgrading (Liew et al., 2022). By selling virtual props, the game mall can attract gamers when they are focused. However, besides that, the mall owner shall consider whether the props are desirable and helpful to gamers.

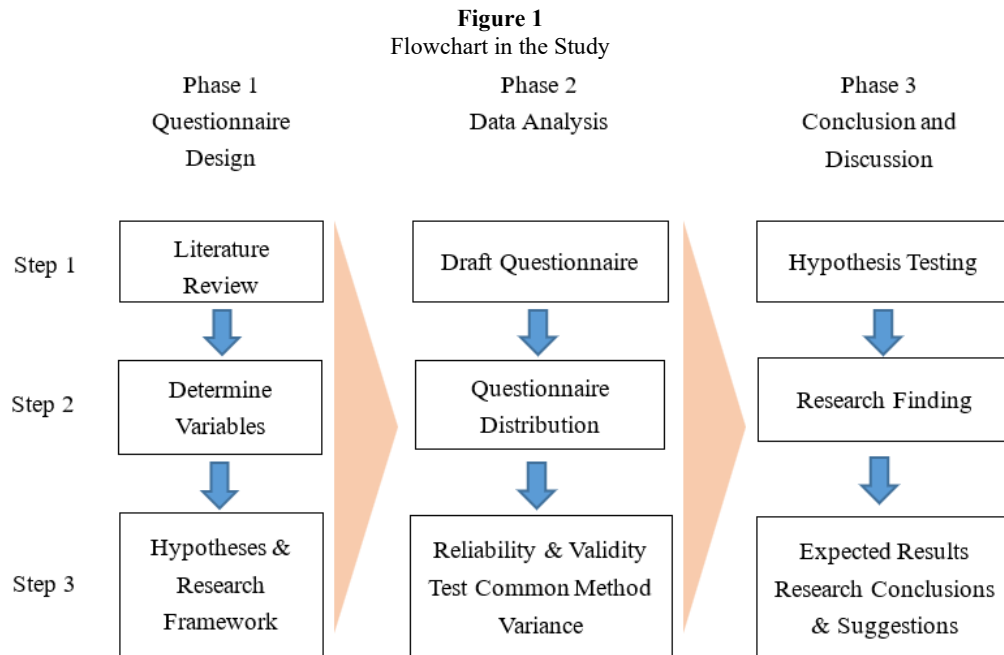
In past studies, purchase intentions have been influenced by gamers' experiences, including features and hedonism (Childers et al., 2001). Feature goods represent game goals and instrumental values, while hedonism suggests fun and enjoyment (Liew et al., 2022). Scarpi et al. (2014) It has been discovered that the driving force behind hedonistic purchases is very important in the online environment. Shen et al. (2016) thought gamers like to buy vanity props from online stores. Previous research proved that virtual props like vanity and feature props can enhance the intention of gamers to continue games (Chang et al., 2014; Sharma et al., 2020; Van der Heijden, 2004; Van der Heijden et al., 2003). Based on all the above, the following two hypotheses were put forward:

H5: "Feature virtual props" will positively influence "purchase intention."

H6: "Vanity virtual props" will positively influence "purchase intention"

III. RESEARCH METHODS

In this research, the literature was utilized to establish a conceptual basis to explain the application of online games in competitive social networks, and related literature on social networks was used to explain the uniqueness of online games. A model of online games in competitive social networks was expanded based on the literature. To determine the factors affecting the application of online games in competitive social networks, a quantitative study was conducted to investigate the gamers who have experienced large competitive online free games. As suggested by Figure 1:



A. Phase 1 Questionnaire Design

The questionnaire design includes three processes, namely, literature review, variable establishment, hypothesis, and research. A new model and structure of online games in competitive social networks were expanded based on the literature.

1. Step 1 Literature Review

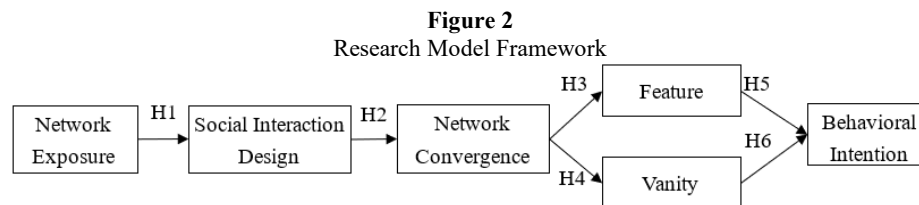
This part used the literature to establish one basic concept to explain the application of online games in competitive social networks. Traditional literature and studies on social networks have illustrated the characteristics of online games. To develop the model of online games in competitive social networks, this study developed a new model based on the summary of the literature.

2. Step 2 Determine Variables

After establishing an application model of online games in competitive social networks, to explain the relationship among variables, some propositions were also derived. To find the factors that affect online games in highly competitive social networks, this study found the external variables of social networks in online games from the literature to analyze.

3. Step 3 Hypotheses and Research Framework

Targeting online free games, this study is aimed at gamers who have played large competitive online free games. The questionnaires were distributed through online game communities and online social communities to further understand whether variables like consumers' network exposure, social interaction design, and network convergence in the online free game society affect the intention to purchase virtual props in the game. On the basis of all the above, the research framework is divided into variables such as network convergence, social interaction design, network exposure, feature, and vanity. The research model framework is shown in Figure 2.



B. Phase 2 Data Analysis

The pre-test part contains questionnaire design, questionnaire distribution, reliability and validity test, and common method variance. Relying on these processes, this paper put forward the pre-test questionnaire based on the research framework, hypotheses, and prior literature to locate the factors that affect the application of online games in competitive social networks. Online random sampling was used to distribute questionnaires to gamers who frequently played competitive, free-to-play online games.

In order to ensure face validity, academic articles in the field of online games and consumer behavior were integrated and sent to the player consumers for measurement items to evaluate the relevance, clarity and appropriateness of each item, and the formal questionnaire was distributed again after modification. In addition, a pilot test was conducted before the formal survey to confirm the reliability and comprehensibility of the questionnaire items. In the end, confirmatory analysis was conducted by PLS.

1. Step 1 Draft Questionnaire

Based on the hypothesis of the research framework and literature, the questionnaire was developed as shown in Table 2.

2. Step 2 Questionnaire Distribution

To locate the factors that affect the application of online games in competitive social networks, online random sampling was used to distribute questionnaires to gamers who have played free online games. In the end, confirmatory analysis was conducted to obtain the data.

Table 2
Research Questionnaire

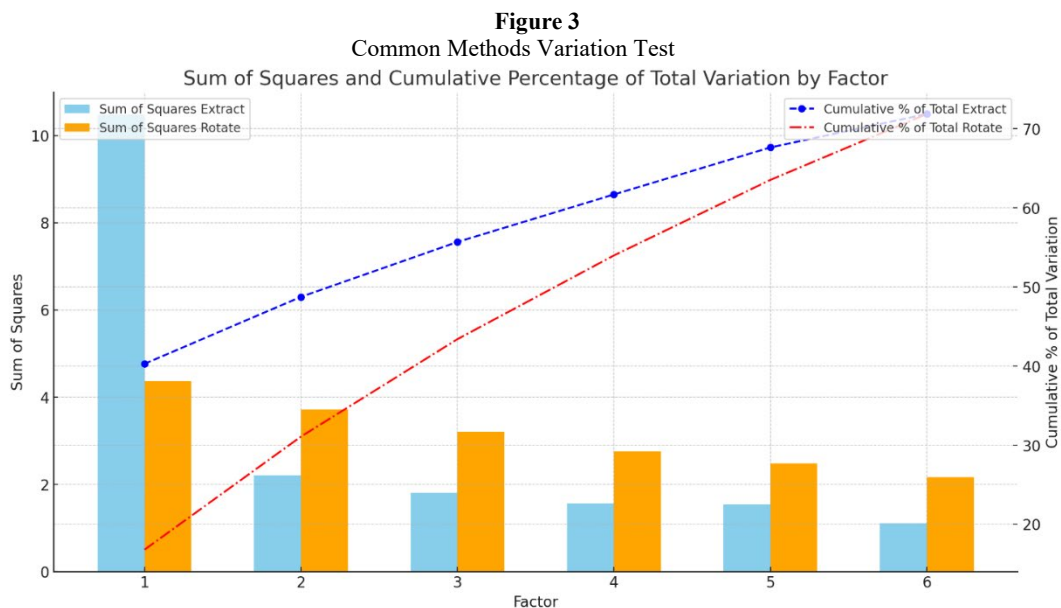
No.	Variables	Items	Source
1	Network Exposure	I like to get attention while playing online games	Hamari (2017)
2		I like to issue orders while playing online games	
3		I like to share tactics and apparel on public platforms while playing online games	
4		I like to show myself naturally while playing online games	
5	Social Interaction Design	I will seek the profile of teammates while playing online games	Krackhardt (1992); Scott (1991); Cho et al. (2012)
6		I will seek the profile of opponents while playing online games	
7		I will add others as friends to chat with them while playing online games	
8		I will seek gamers similar to myself based on their apparel or skills while playing online games	
9		I will share my knowledge with friends in the game to make more friends while playing online games	
10		My online friends and I depend on each other while playing online games	
11	Network Convergence	I like to learn skills of the same level as mine while playing online games.	Wasserman and Faust (1994); Keohane (1986)
12		I like to join a union (group) of the same level as mine while playing online games.	
13		I like to solve problems with other gamers in online games	
14		I introduce friends to online gamers of the same level in online games	
15		I will proactively meet people of the same level or skill in online games	
16		I can share tactics and apparel with other gamers of the same level in online games	
17	Feature	I hope to finish tasks in the shortest time in online games	Rodríguez (2017); Hamari (2017); Belk (2014); Rodríguez (2017); Hamari (2017); Belk (2014); Lehdonvirta et al. (2009)
18		I hope the characters can become strong and powerful in online games	
19		I hope I can claw my way to victory in online games	
20		I hope to be top-ranking in online games	
21	Vanity	I can have fun playing online games	Lehdonvirta et al. (2009)
22		I can show myself freely in online games	
23		I can show off to friends in online games	
24	Purchase Intention	Will you purchase virtual props in online games?	Jang et al. (2021)
25		Will you purchase equipment-based props (like moving speed, attack speed, attack power, defense power, and health point) in online games?	
26		Will you purchase clothing in online games?	

Source: Summarized by this study

3. Step 3 Reliability and Validity Test and Common Method Variance

The data analysis was conducted after the collection of the formal questionnaire, and PLS 3 was used as the analysis tool. PLS is a method of multivariate statistical analysis proposed by Wold, which has rapidly developed in theory, methods, and applications recently. PLS integrates important statistical techniques like multiple linear regression, principal component analysis, and canonical correlation analysis to establish the model, achieving various applications of data analysis. Therefore, using this method, this study investigated whether variables like network exposure, social interaction design, and network convergence in the online free game society affect the intention to purchase virtual props in the game and further inquired into consumer behaviors.

The study depended on IBM SPSS Statistics 23 to record data and then used SEM Marker Variable technology to examine Common Method Variance (CMV) (Williams et al., 2010). The research uses online questionnaires to collect data. Except for descriptive items, all items with different levels of inquiry are filled out with the Likert scale. As the same person answers both independent and dependent variables, to avoid the common method variance, this research determines whether there is a CMV problem through a backtest (Keohane, 1986). The factor analysis was performed on the scores of all questions in the questionnaire, and the first principal component was examined before turning the axis. If the main variance of independent and dependent variables is explained in this factor, then there is a serious CMV in this study. If the explained variance of the first principal component exceeds 50%, then a CMV problem exists. After the factor analysis, the explained variance of the first principal component in this study was 40.279%, indicating that no common method variation existed in the questionnaire, as shown in Figure 3.



C. Phase 3 Conclusion and Discussion

The conclusion and discussion part contains hypothesis testing, research finding, and expected results (research conclusions and suggestions). These three processes are used to explore conclusions, and the collected data are analyzed to discuss managerial implications and suggestions.

1. Step 1 Hypothesis Testing

Hypothesis testing is a method used in statistical inference to test statistical hypotheses that observes a model of a set of random variables. This study verified the collected random samples through hypothesis testing.

2. Step 2 Research Finding

Research has found that network exposure can significantly influence social interaction design and network convergence, while only network convergence has a significant impact on vanity. This also indicates that large online competitive gamers are concerned about whether they can boldly express and show themselves to even feel a sense of honor when purchasing virtual goods. They do not care whether they can continue to break the level or upgrade the roles if they can be noticed and attractive in the game.

3. Step 3 Expected Results (Research Conclusions and Suggestions)

1. *Academic Contribution:*

To further understand whether variables like consumers' network exposure, social interaction design, and network convergence in the online free game society affect the intention to purchase virtual props in the game.

2. *Practical Contribution:*

This research distributed questionnaires through online gaming unions and online communities to identify the factors influencing gamers' purchase intention of equipment and apparel. Understanding the consumer behavior of gamers in unions and communities may help serve as a reference for future online free game developers to increase sales and profit when the games are free.

IV. RESEARCH ANALYSIS AND RESULTS

Smart PLS 3.0 was utilized as the tool for statistical analysis in this study. Partial least squares (PLS) is an analytical method used to examine or construct predictive models. The main purpose is to test the correlation between dimensions. Compared with the general linear structural relationship model, PLS can produce better results when analyzing the causal relationship among constructs to prove the reliability and validity of the framework and questionnaires.

A. Descriptive Statistical Analysis

The questionnaire was distributed to gamers of large competitive online free games, primarily through major MMORPG online communities and university student groups in Taiwan. A total of 215 valid questionnaires were obtained, and data analysis was later conducted. The collected valid samples were analyzed based on their characteristics, such as gender, age, highest education level, occupation, and monthly spending. In addition, this paper analyzed and explored whether factors such as network exposure, social interaction design, and network convergence can affect the purchase of virtual goods by online gamers of samples. Then the validity analysis was carried out, and the hypotheses were verified.

B. Basic Background of Samples

According to the analysis of the basic data of the subjects, the proportion of women (45.12%) exceeded that of men (54.88%) in samples. The majority is around “18-24 years old”, accounting for 64.65%, followed by “25-34 years old”, accounting for 30.70%. The highest education level is “junior college”, accounting for 67.44%. In terms of current positions, “students” are the majority (44.19%), followed by “service industry” (15.81%). Within one month, the amount spent by gamers on games is mainly “less than NT\$500 (included)” (62.33%), followed by “1001 NT\$ - 1500 NT\$” (14.88% respectively).

Table 3
Distribution and Percentage of Basic Profile of the Samples

Sample Characteristic	Measured Items	Number of Times	Percentage (%)
Gender	Male	118	54.88%
	Female	97	45.12%
Age	18-24	139	64.65%
	25-34	66	30.70%
	35-44	6	2.79%
	Above 45	4	1.86%
Background	Senior High School (Vocational)	39	18.14%
	Junior College (University)	145	67.44%
	Postgraduate (Above)	30	13.95%
Occupation	Student	95	44.19%
	Industry	34	15.81%
	Service Industry	34	15.81%
	Business	23	10.70%
	Others	13	6.05%
	Education	8	3.72%
	Military Police	6	2.79%
	Medical Treatment	2	0.93%
	Public Official	1	0.47%
Monthly Spending on Games	NT\$500 (included)	134	62.33%
	NT\$501-NT\$1000	22	10.23%
	NT\$1001-NT\$1500	32	14.88%
	NT\$1501-NT\$2000	9	4.19%
	Above NT\$2001	18	8.37%

Source: Summarized by this study

C. Model Test

The model structure of this study is divided into variables such as “network exposure”, “social interaction design”, “network convergence”, “feature”, and “vanity”. Online free gamers can promote personal communication and network density through interpersonal recommendations. Furthermore, higher exposure will result in higher perceived social interaction among gamers achieving convergence. Based on this study, it is most important to socialize and connect with others in the virtual world, and gamers can share their perfect egos with others in the game. Then, this study explored whether factors such as network exposure, social interaction design, and network convergence can affect purchase intention and the mediating effect between feature and vanity to analyze consumer behavior in the online free game society.

A total of 215 valid questionnaires were collected for model verification. The results of the competitive model showed that the NFI equaled 0.68, the SRMR was 0.071, the composite reliability of each factor ranged between 0.886 to 0.935, and the average variance extracted (AVE) was greater than 0.5, ranging from 0.517 to 0.795. The models have internal consistency in all dimensions, and Cronbach’s alpha of each measurement variable is significant (larger than 0.7), indicating that the research has good reliability to converge, as shown in Table 4.

Table 4
Correlation Matrix of Reliability and Validity of the Research Model and Each Construct

	Cronbach’s a	rho A	CR	AVE	AC	VA	IE	NC	PI	SOD
AC	0.740	0.864	0.838	0.591	0.769					
VA	0.834	0.838	0.900	0.750	0.666	0.866				
IE	0.813	0.815	0.865	0.517	0.544	0.656	0.719			
NC	0.907	0.910	0.935	0.781	0.484	0.624	0.618	0.884		
PI	0.871	0.871	0.921	0.795	0.249	0.466	0.342	0.393	0.892	
SOD	0.855	0.855	0.892	0.579	0.547	0.655	0.745	0.701	0.416	0.761

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; the diagonal value is the square root of the average variance extracted (AVE) of the construct; AF = Feature; VA = Vanity; IE = network exposure; PI = Purchase Intention; NC = Network Convergence; SOD = Social Interaction Design

The hypothesis testing results of the research model indicated that network exposure has a significant positive impact on social interaction design ($H_1; \beta = .745$), social interaction design has a significant positive impact on network convergence ($H_2; \beta = .701$), network convergence has a significant positive impact on sociality ($H_3; \beta = .484$), network convergence has a significant positive impact on vanity ($H_4; \beta = .624$), feature negativity will not significantly affect behavioral intention ($H_5; \beta = -.111$), vanity has a significant positive impact on behavioral intention ($H_6; \beta = .540$) as suggested by Figure 4.

The analysis results of the questionnaire showed that the influence of factors such as network exposure, social interaction design, and network convergence was significant to path coefficients of feature and vanity. However, the influence of features was not significant to purchase intention, implying that gamers consider purchasing feature props unimportant under the covering of social positions and roles, as shown in Table 5.

Figure 4
Research Model Framework of Sample Test

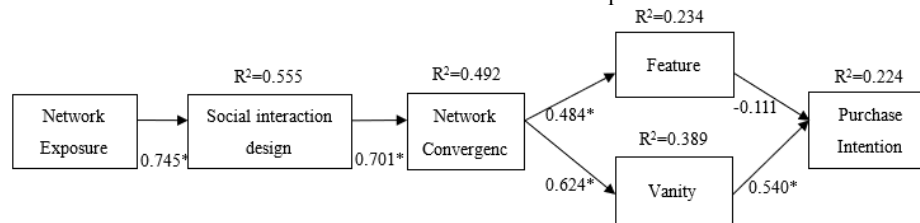


Table 5
Research Model and Competitive Model Efficient

Items	Relation	Path Coefficient	t Statistics
H1: Network Exposure→Social Interaction Design	+	0.745*	19.165
H2: Social Interaction Design→Network Convergence	+	0.701*	17.797
H3: Network Convergence→Feature	+	0.484*	8.673
H4: Network Convergence→Vanity	+	0.624*	12.294
H5: Feature→Behavioral Intention	+	-0.111*	1.127
H6: Vanity→Behavioral Intention	+	0.540*	6.378

The SEM-PLS statistical software was used for analysis, and the least squares method was applied to prove the reliability and validity of the framework and questionnaire. The results revealed that the influence of network exposure to social interaction design, network convergence, vanity, and purchase intention is obvious in path coefficients. However, network exposure has a negative and implicit effect on features, indicating that gamers are most concerned about the attention of others.

V. CONCLUSION

This study mainly centered on how consumers can affect their purchase intention of game equipment and apparel through variables like network exposure, social interaction design, and network convergence. According to the above results, the confirmatory factor analysis is employed to verify the reliability and validity of the questionnaire and the model fitness. Research conclusions contain academic contributions and practical implications.

A. Academic Contribution

Based on research results, variables like network exposure, social interaction design, and network convergence in the large online free-game society can affect the intention of consumers to purchase virtual vanity props. In accordance with this study, in the virtual world, the vain gamer is like a peacock whose flaunting is magnificent, boastful, and domineering. Moreover, such gamers attach great importance to image and are good at building interpersonal relationships, and tend to be vainglorious, ambitious, jealous, etc. Detached from reality through online games, gamers become pretentious to achieve their ideal perfect images. Feature gamers, on the other hand, can lock on to targets like the eagles, who complete tasks quickly and sharply. Such gamers can achieve self-identification by breaking levels with the help of feature virtual goods in the game.

In comparison with previous SIT-based studies, this research both aligns with and extends prior findings. For example, Wang (2022) emphasized that social identity in games is often rooted in players' pursuit of self-accomplishment and social presence. While Wang highlighted emotional connection and immersion, our study distinguishes between two identity orientations—achievement-focused (Eagle) and vanity-driven (Peacock)—which offer a more nuanced categorization within the SIT framework.

Furthermore, while the main model did not include demographic variables as primary predictors, an exploratory observation of the data reveals some interesting patterns worth noting. For instance, younger gamers (ages 18–25) and university students showed a higher tendency to identify with the vanity-oriented “peacock” type, placing greater emphasis on appearance and social image in the game. In contrast, older gamers and those with higher in-game spending levels were more likely to align with the feature-oriented “eagle” type, focusing on efficiency, task completion, and performance-based achievements. Although these trends fall outside the main scope of the structural model, they provide meaningful directions for future research, particularly regarding the role of age, income, or player experience level in shaping social identity types in virtual environments.

B. Practical Implications

This research distributed questionnaires through online gaming unions and online communities to identify the factors influencing gamers' purchase intention of equipment and apparel. Understanding the consumer behavior of gamers in unions and communities may help serve as a reference for future online free game developers to increase sales and profit when the games are free. It is also found that factors like network exposure, social interaction design, and network convergence have significant impacts on vanity and purchase intention, indicating that peers only care about whether the gamer is dazzling and shows a perfect alter ego in the virtual world. Thus, this study provided some practical suggestions for the developers of free online games. For example, unions or communities can hold competitions about gorgeous dresses and popularity ranking so that gamers can be encouraged to buy goods in a sharing world, thus bringing more sales and profits.

Moreover, the distinction between “peacock” and “eagle” gamers offers practical insights for targeted marketing strategies. For vanity-driven “peacock” players, developers can design marketing campaigns centered on limited-edition costumes, social status symbols, and visual customization items—enhancing the appeal of identity projection and social recognition. In contrast, achievement-focused “eagle” players may respond better to promotions that highlight performance-enhancing items, time-saving boosts, or exclusive access to high-level gear that enhances gameplay efficiency. By aligning in-game promotions with these underlying psychological identities, developers can increase player engagement, optimize monetization, and cultivate a more loyal user base. This archetype-based marketing segmentation further underlines the study's originality and enhances its relevance for practitioners in the free-to-play gaming industry.

REFERENCES

- Alha, K., Koskinen, E., Paavilainen, J., Hamari, J., and Kinnunen, J., 2014, Free-to-Play Games: Professionals' Perspective. *Proceedings of DiGRA Nordic 2014*.
- Ang, C.S., 2011, Interaction Networks and Patterns of Guild Community in Massively Multiplayer Online Games. *Social Network Analysis and Mining*, 1, 341-353.
- Ang, C.S., and Zaphiris, P., 2010, Social Roles of Players in MMORPG Guilds: A Social Network Analytic Perspective. *Information, Communication and Society*, 13, 592-614.
- Babin, B.J., Darden, W.R., and Griffin, M., 1994, Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value. *Journal of Consumer Research*, 20, 644-656.
- Belk, R., 2014, You Are What You Can Access: Sharing and Collaborative Consumption Online. *Journal of Business Research*, 67, 1595-1600.
- Chang, C.-W., and Hsu, C.-P., 2022, How to Generate Customer and Firm Benefits through Online Game Product and Brand Community Engagement—Online and Offline Perspectives. *Journal of Product and Brand Management*(ahead-of-print).
- Chang, I.-C., Liu, C.-C., and Chen, K., 2014, The Effects of Hedonic /Utilitarian Expectations and Social Influence on Continuance Intention to Play Online Games. *Internet Research*, 24, 21-45.
- Charlton, J.P., and Danforth, I.D., 2007, Distinguishing Addiction and High Engagement in the Context of Online Game Playing. *Computers in Human Behavior*, 23, 1531-1548.
- Chen, A., Lu, Y., and Wang, B., 2016, Enhancing Perceived Enjoyment in Social Games through Social and Gaming Factors. *Information Technology and People*, 29, 99-119.
- Cheung, C.M., and Lee, M.K., 2010, A Theoretical Model of Intentional Social Action in Online Social Networks. *Decision Support Systems*, 49, 24-30.
- Childers, T.L., Carr, C.L., Peck, J., and Carson, S., 2001, Hedonic and Utilitarian Motivations for Online Retail Shopping Behavior. *Journal of Retailing*, 77, 511-535.
- Dholakia, R.R., 1999, Going Shopping: Key Determinants of Shopping Behaviors and Motivations. *International Journal of Retail and Distribution Management*.
- Dizard Jr, W.P., 2021, *MegaNet: How the global Communications Network will Connect Everyone on Earth*. Routledge.
- Dormans, J., 2006, On the Role of the Die: A Brief Ludologic Study of Pen-and-paper Roleplaying Games and Their Rules. *Game Studies*, 6.
- Ducheneaut, N., Yee, N., Nickell, E., and Moore, R.J., 2006, " Alone Together?" Exploring the Social Dynamics of Massively Multiplayer Online Games. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*.
- Elmer-DeWitt, P., 1995, Welcome to Cyberspace. *Time*, 145, 4-11.
- Esports, N.G., 2021, Live Streaming Market Report. In: Technical report.
- Fairfield, J.A., 2005, Virtual Property. *BUL Rev.*, 85, 1047.
- Gamer, L., 2009, Virtual Item Monetization: A Powerful Revenue Opportunity for Online Game Publishers and Virtual World Operators. *Accessed at 14*.
- Granovetter, M., 1978, Threshold Models of Collective Behavior. *American Journal of Sociology*, 83, 1420-1443.
- Guo, Y., and Barnes, S., 2007, Why Do People Buy Virtual Items in Virtual Worlds with Real Money? *ACM SIGMIS Database: The DATABASE for Advances in*

- Information Systems*, 38, 69-76.
- Hamari, J., and Eranti, V., 2011, Framework for Designing and Evaluating Game Achievements. Digra Conference,
- Hamari, J., Hanner, N., and Koivisto, J., 2017, Service Quality Explains Why People Use Freemium Services But Not If They Go Premium: An Empirical Study in Free-to-Play Games. *International Journal of Information Management*, 37, 1449-1459.
- Hamari, J., and Keronen, L., 2017a, Why Do People Buy Virtual Goods: A Meta-analysis. *Computers in Human Behavior*, 71, 59-69.
- Hamari, J., and Keronen, L., 2017b, Why Do People Play Games? A Meta-analysis. *International Journal of Information Management*, 37, 125-141.
- Hamari, J., and Lehdonvirta, V., 2010, Game Design as Marketing: How Game Mechanics Create Demand for Virtual Goods. *International Journal of Business Science and Applied Management*, 5, 14-29.
- Han, J.J., Zheng, R.J., and Xu, Y., 2007, The Effect of Individual Needs, Trust and Identification in Explaining Participation Intentions in Virtual Communities. 2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07),
- Hirschman, E.C., 1983, Predictors of Self-projection, Fantasy Fulfillment, and Escapism. *The Journal of Social Psychology*, 120, 63-76.
- Hirschman, E.C., and Holbrook, M.B., 1982, Hedonic Consumption: Emerging Concepts, Methods and Propositions. *Journal of Marketing*, 46, 92-101.
- Holbrook, M.B., and Hirschman, E.C., 1982, The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun. *Journal of Consumer Research*, 9, 132-140.
- Hollebeek, L.D., Abbasi, A.Z., Schultz, C.D., Ting, D.H., and Sigurdsson, V., 2022, Hedonic Consumption Experience in Videogaming: A Multidimensional Perspective. *Journal of Retailing and Consumer Services*, 65, 102892.
- Hsu, C.-L., and Lu, H.-P., 2004, Why Do People Play Online Games? An Extended TAM with Social Influences and Flow Experience. *Information and Management*, 41, 853-868.
- Huang, H.-C., Cheng, T., Huang, W.-F., and Teng, C.-I., 2018, Impact of Online Gamers' Personality Traits on Interdependence, Network Convergence, and Continuance Intention: Perspective of Social Exchange Theory. *International Journal of Information Management*, 38, 232-242.
- Jakobsson, M., 2011, The Achievement Machine: Understanding Xbox 360 Achievements in Gaming Practices. *Game Studies*, 11, 1-22.
- Jang, M., Lee, R., and Yoo, B., 2021, Does Fun or Freebie Increase in-app Purchases? *Information Systems and e-Business Management*, 19, 439-457.
- Jones, S., 2003, Let the Games Begin: Gaming Technology and College Students.
- Keohane, R.O., 1986, Reciprocity in International Relations. *International organization*, 40, 1-27.
- Kerr, A., 2008, TL Taylor, Play between Worlds: Exploring Online Game Culture. *European Journal of Cultural Studies*, 11, 173-175.
- Kim, M. J., Lee, C.-K., and Contractor, N.S., 2019, Seniors' Usage of Mobile Social Network Sites: Applying Theories of Innovation Diffusion and Uses and Gratifications. *Computers in Human Behavior*, 90, 60-73.
- Klimmt, C., and Vorderer, P., 2003, Media psychology "Is Not Yet There": Introducing Theories on Media Entertainment to the Present Debate. *Presence*, 12, 346-359.
- Krackhardt, D., 1992, A Caveat on the Use of the Quadratic Assignment Procedure.

- Journal of Quantitative Anthropology*, 3, 279-296.
- Kuo, Y.-F., Wu, C.-M., and Deng, W.-J., 2009, The Relationships among Service Quality, Perceived Value, Customer Satisfaction, and Post-purchase Intention in Mobile Value-added Services. *Computers in Human Behavior*, 25, 887-896.
- Lea, M., and Spears, R., 1995, Love at First Byte? Building Personal Relationships over Computer Networks.
- Lee, Z.W., Cheung, C.M., and Chan, T.K., 2021, Understanding Massively Multiplayer Online Role-playing Game Addiction: Hedonics Management Perspective. *Information Systems Journal*, 31, 33-61.
- Lehdonvirta, V., 2009, Virtual Item Sales as a Revenue Model: Identifying Attributes that Drive Purchase Decisions. *Electronic Commerce Research*, 9, 97-113.
- Lehdonvirta, V., and Castronova, E., 2014, *Virtual Economies: Design and Analysis*. MIT Press.
- Lemmens, J., Valkenburg, P., and Peter, J., 2011, Psykosociale Årsager og Konsekvenser af Patologisk Spil. *Computere Menneskelig Adfærd*, 27.
- Lepper, M.R., Greene, D., and Nisbett, R.E., 1973, Undermining Children's Intrinsic Interest with Extrinsic Reward: A Test of the "Overjustification" Hypothesis. *Journal of Personality and Social Psychology*, 28, 129.
- Li, H., Liu, Y., Xu, X., Heikkilä, J., and van der Heijden, H., 2015, Modeling Hedonic is Continuance through the Uses and Gratifications Theory: An Empirical Study in Online Games. *Computers in Human Behavior*, 48, 261-272.
- Liao, G.-Y., Pham, T.T.L., Cheng, T., and Teng, C.-I., 2020a, How Online Gamers' Participation Fosters Their Team Commitment: Perspective of Social Identity Theory. *International Journal of Information Management*, 52, 102095.
- Liao, G.-Y., Pham, T.T.L., Cheng, T., and Teng, C.-I., 2020b, Impacts of Real-world Need Satisfaction on Online Gamer Loyalty: Perspective of Self-affirmation Theory. *Computers in Human Behavior*, 103, 91-100.
- Liew, T.W., Gan, C.L., Tan, S.-M., Koh, Y.P., and Yeo, S.F., 2022, How Social Influence and Hedonice/Utilitarian Outcome Expectations Affect Continuance Intention to Play Online Games. 2022 International Conference on Digital Transformation and Intelligence (ICDI),
- Lin, H., and Sun, C.-T., 2007, Cash Trade within the Magic Circle: Free-to-play Game Challenges and Massively Multiplayer Online Game Player Responses. DiGRA Conference,
- Markus, H.R., and Kitayama, S., 1991, Culture and the Self: Implications for Cognition, Emotion, and Motivation. *Psychological Review*, 98, 224.
- Maurer, B., Lankes, M., Stiglbauer, B., and Tscheligi, M., 2016, EyeCo: Effects of Shared Gaze on Social Presence in an Online Cooperative Game. Entertainment Computing-ICEC 2016: 15th IFIP TC 14 International Conference, Vienna, Austria, September 28-30, 2016, Proceedings 15,
- Morrison, E.W., 2002, Newcomers' Relationships: The Role of Social Network Ties during Socialization. *Academy of Management Journal*, 45, 1149-1160.
- Morschheuser, B., Riar, M., Hamari, J., and Maedche, A., 2017, How do Games Induce Cooperation? A Study on the Relationship between Game Features and We-intentions in an augmented Reality Game. *Computers in Human Behavior*, 77, 169-183.
- Muller, E., and Peres, R., 2019, The Effect of Social Networks Structure on Innovation

- Performance: A Review and Directions for Research. *International Journal of Research in Marketing*, 36, 3-19.
- Nieborg, D.B., 2015, Crushing Candy: The Free-to-play Game in Its Connective Commodity Form. *Social Media+ Society*, 1, 2056305115621932.
- O'Shaughnessy, J., and O'Shaughnessy, N.J., 2002, Marketing, the Consumer Society and Hedonism. *European Journal of Marketing*.
- Oldenburg, R., 1999, *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of A Community*. Da Capo Press.
- Parks, M.R., Berger, C., and Burgoon, M., 1995, Webs of Influence in Interpersonal Relationships. *Communication and Social Influence Processes*, 155-178.
- Parks, M.R., and Eggert, L.L., 1991, The Role of Social Context in the Dynamics of Personal Relationships.
- Parks, M.R., and Floyd, K., 1996, Making Friends in Cyberspace. *Journal of Computer-mediated Communication*, 1, JCMC144.
- Pham, T.T.L., Huang, T.-L., Liao, G.-Y., Chou, Y.-J., Cheng, T., and Teng, C.-I., 2023, Cooperate to Play: How in-game Cooperation Knowledge Impacts Online Gamer Loyalty. *Computers in Human Behavior*, 143, 107686.
- Rafaeli, S., and LaRose, R.J., 1993, Electronic Bulletin Boards and "Public Goods" Explanations of Collaborative Mass Media. *Communication Research*, 20, 277-297.
- Rodríguez, B., 2017, Purchasing Behavior on Aesthetic Items in Online Video Games with Real Currency: The Case of Counter-Strike: Global Offensive. In.
- Scarpi, D., Pizzi, G., and Visentin, M., 2014, Shopping for fun or Shopping to Buy: Is It Different Online and Offline? *Journal of Retailing and Consumer Services*, 21, 258-267.
- Setterstrom, A.J., Pearson, J.M., and Guggenheim, D., 2018, The Impact of Social Environment on Willingness to Pay for Online Content. *Journal of Internet Commerce*, 17, 283-309.
- Sharma, T.G., Tak, P., and Kesharwani, A., 2020, Understanding Continuance Intention to Play Online Games: The Roles of Hedonic Value, Utilitarian Value and Perceived Risk. *Journal of Internet Commerce*, 19, 346-372.
- Shen, C.C., and Chiou, J.S., 2009, The Effect of Community Identification on Attitude and Intention toward a Blogging Community. *Internet Research*, 19, 393-407.
- Shen, K. N., Cai, Y., and Guo, Z., 2016, When Do Online Consumers Shop in an Offline Store: The Moderating Effects of Product Characteristics. *Journal of Marketing Channels*, 23, 129-145.
- Singelis, T.M., 1994, The Measurement of Independent and Interdependent Self-Constructs. *Personality and Social Psychology Bulletin*, 20, 580-591.
- Steinkuehler, C.A., and Williams, D., 2006, Where Everybody Knows Your (screen) Name: Online Games as "Third Places". *Journal of Computer-mediated Communication*, 11, 885-909.
- Strijbos, J., Martens, R., and Jochems, W., 2003, The Effect of Roles on Group Efficiency. *Wasson, B.; Baggetun, R.; Hoppe, U.*
- Taylor, S.E., 2006, Tend and Befriend: Biobehavioral Bases of Affiliation under Stress. *Current directions in psychological science*, 15, 273-277.
- Teng, C.-I., 2015, Drivers of Interdependence and Network Convergence in Social Networks in Virtual Communities. *Electronic Commerce Research and Applications*, 14, 204-212.

- Teng, C.-I., Chen, M.-Y., Chen, Y.-J., and Li, Y.-J., 2012, Loyalty due to Others: The Relationships among Challenge, Interdependence, and Online Gamer Loyalty. *Journal of Computer-mediated Communication*, 17, 489-500.
- Trepte, S., Reinecke, L., and Juechems, K., 2012, The Social Side of Gaming: How Playing Online Computer Games Creates Online and Offline Social Support. *Computers in Human Behavior*, 28, 832-839.
- Tseng, F.-C., Huang, H.-C., and Teng, C.-I., 2015, How Do Online Game Communities Retain Gamers? Social Presence and Social Capital Perspectives. *Journal of Computer-mediated Communication*, 20, 601-614.
- Uysal, A., 2016, Commitment to Multiplayer Online Games: An Investment Model Approach. *Computers in Human Behavior*, 61, 357-363.
- Van der Heijden, H., 2004, User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 695-704.
- Van der Heijden, H., Verhagen, T., and Creemers, M., 2003, Understanding Online Purchase Intentions: Contributions from Technology and Trust Perspectives. *European Journal of Information Systems*, 12, 41-48.
- Venkatesh, V., and Brown, S.A., 2001, A Longitudinal Investigation of Personal Computers in Homes: Adoption Determinants and Emerging Challenges. *MIS Quarterly*, 71-102.
- Vorderer, P., Hartmann, T., and Klimmt, C., 2003, Explaining the Enjoyment of Playing Video Games: the Role of Competition. Proceedings of the Second International Conference on Entertainment Computing,
- Weiss, T., and Loebbecke, C., 2008, Online Gaming Adoption in Competitive Social Networks: Combining the Theory of Planned Behavior and Social Network Theory.
- Williams, D., Ducheneaut, N., Xiong, L., Zhang, Y., Yee, N., and Nickell, E., 2006, From Tree House to Barracks: The Social Life of Guilds in World of Warcraft. *Games and Culture*, 1, 338-361.
- Williams, F., and Rice, R.E., 1983, Communication Research and the New Media Technologies. *Annals of the International Communication Association*, 7, 200-224.
- Williams, L. J., Hartman, N., and Cavazotte, F., 2010, Method Variance and Marker Variables: A Review and Comprehensive CFA Marker Technique. *Organizational Research Methods*, 13, 477-514.
- Wold, H., 1975, Path Models with latent Variables: The NIPALS Approach. In *Quantitative Sociology*, 307-357. Elsevier.
- Yee, N., 2002, Understanding MMORPG addiction. Retrieved February 15, 2008.

Additional Literatures:

- Wang, L., 2022, Understanding Peer Recommendation in Mobile Social Games: The Role of Needs-supplies Fit and Game Identification. *Information Technology and People*, 35, 677-702.
- Chuang, Y.W., 2020, Promoting Consumer Engagement in Online Communities through Virtual Experience and Social Identity. *Sustainability*, 12, 855.
- Liao, G.Y., Van Nguyen, H., Cheng, T.C.E., and Teng, C.I., 2020, How Do Social Networks Foster Online Gamer Loyalty? Perspective of Weak/Strong Tie Theory. *Telematics and Informatics*, 53, 101437.
- Tajfel, H., Turner, J.C., Austin, W.G., and Worchel, S., 1979, An Integrative Theory of Intergroup Conflict. *Organizational Identity: A Reader*, 56, 9780203505984-16.

- Caponnetto, P., Triscari, S., Maglia, M., and Quattropani, M.C., 2021, The Simulation Game—Virtual Reality Therapy for the Treatment of Social Anxiety Disorder: A Systematic Review. *International Journal of Environmental Research and Public Health*, 18, 13209.
- De Freitas, S., and Griffiths, M., 2008, The Convergence of Gaming Practices with other Media Forms: What Potential for Learning? A Review of the Literature. *Learning, Media and Technology*, 33, 11-20.
- Mäntymäki, M., and Islam, A.N., 2014, Social Virtual World Continuance among Teens: Uncovering the Moderating Role of Perceived Aggregate Network Exposure. *Behaviour and Information Technology*, 33, 536-547.
- Jakobsson, M., 2006, *Virtual Worlds and Social Interaction Design* (Doctoral Dissertation, Informatik).
- Liao, G.Y., Huang, T.L., Dennis, A.R., and Teng, C.I., 2023, Friend-connecting Affordances: Playing Online Games to Contact Friends. *Internet Research*.