The effects of a player’s network centrality on resource accessibility, game enjoyment, and continuance intention: A study on online gaming communities

Cheng-Chieh Hsiao, Jyh-Shen Chiou

Abstract

This study applies social capital theory to investigate how a player’s network centrality in an online gaming community (i.e., a guild) affects his/her attitude and continuance intention toward a Massive Multiplayer Online Game (MMOG). Analysis of 347 usable responses shows that players’ network centrality has a negative impact on their ties to players who belong to other guilds (i.e., non-guild interaction), but a positive effect on players’ access to resources. However, players’ network centrality fails to increase their perceived game enjoyment directly. Players’ resource accessibility and perceived game enjoyment play mediating roles in the relationship between network centrality and attitude toward playing an MMOG, which in turn influences game continuance intention. The results also show that although players’ non-guild interaction is negatively related to their resource accessibility from the networks, it is positively associated with perceived game enjoyment. The article concludes with implications and limitations of the study.

1. Introduction

The online game market is growing rapidly across the globe. Worldwide revenue from online games is estimated to go from 15.7 billion US dollars in 2010 to 29 billion US dollars in 2016 (DFC Intelligence 2011). Among online games, the rapidly expanding Massive Multiplayer Online Game (MMOG) market has drawn digital marketers’ attention. MMOGs, such as World of Warcraft (WOW) and EverQuest, are ongoing games in which consumers play individually, in teams, or in communities within an evolving virtual world (OECD 2005). According to Wu (2010), the global MMOG market generated 6 billion US dollars in 2010. While consumers spend increasing amounts of money for high-quality online games, the MMOG global subscription market remains positive and competitive. MMOG market revenues are expected to reach 8 billion US dollars in 2014 (Wu 2010).

As the overall market of MMOGs grows, some MMOG companies are likely to feel increased competitive pressure in sustaining their market advantage. For example, the market share of Activision Blizzard, a dominant subscription-MMOG operator, declined from 60% in 2008 to 54% in 2009 (Screen Digest 2010), indicating a critical problem with players’ continuance intention in MMOGs. This means that subscription-based MMOGs require innovations to increase players’ stickiness to the games, resulting in their continued monthly subscription. Customer retention is a source of competitive advantage for these MMOG service providers, especially in light of the challenge presented by free and casual games.

When playing an MMOG, individuals develop their own social relationships in the virtual world. They tend to establish or join online gaming communities that are important social units in the MMOG context (Ducheneaut et al. 2006). Online gaming communities, known as player guilds, represent fertile ground for the development of social capital (Chan and Vorderer 2006). The magnitude of a player’s network centrality, which reflects the extent to which a player is embedded in an online gaming community (Ahuja et al. 2003, Wasko and Faraj 2005), enhances his/her access to difficult challenges and valuable resources (e.g., in-game money, goods, equipment, skill masters, and services) from the community. In a similar fashion, many online service providers increasingly create virtual communities of practice with their electronic services to promote inter-customer interaction. Because individual transactions with an online service provider are motivated by the need to enhance consumer-to-consumer bonds in a virtual community (Cova 1997), a player’s favorable communal experience is likely to become associated with his/her positive attitudinal and behavioral responses to an MMOG; this in turn will increase personal consumption of products/services related to the MMOG.

Although a player decides to join a specific guild, that player can interact with players who belong to other guilds by forming social knots to take game challenges. Social knots are defined as groups...
created to complete a task of relatively short duration (Engeström et al. 1999, Nardi and Harris 2006). In addition to within-guild ties, a player’s ties to those from other guilds (i.e., non-guild interaction) may provide another way for players to enjoy game adventures. If a player cannot get help or find opportunities for high-level challenges from his/her own guild, he/she is likely to collaborate with non-guild players to complete game tasks. The goal-oriented player can participate in other guilds’ activities and enjoy game experiences by developing short-term knots. These temporary groups and teams are dissolved when the goals of a specific challenge are achieved. Such task-based knots do not affect anyone’s membership in an online gaming community.

Despite both types of social interaction being of value to a player, it appears difficult to balance these social ties due to the player’s limited social time and energy. In some situations, a player may choose to collaborate with guild members and decline boundary-spanning activities to maintain his/her network centrality. Therefore, we argue that intra- and extra-guild ties represent two significant aspects of a player’s social life in an MMOG. To provide a complete picture of the social dynamics in an MMOG, researchers must examine these interactions simultaneously.

Recently, online gaming behaviors have been investigated by researchers in the fields of marketing, information technology/systems, media and communication, and psychology. Prior behavioral studies have tested a bundle of factors that influence customers’ intention toward playing online games or MMOGs, including use-fulness (Hsu and Lu 2004), enjoyment (Wu and Liu 2007, Koo 2009), flow experience (Hsu and Lu 2004, Lee 2009), subjective norms (Hsu and Lu 2004, Lee 2009), presence (Teng 2010), Internet addiction (Lu and Wang 2008), escapism (Yee 2006), concentration (Koo 2009), service mechanisms (Wu et al. 2010), and system design (Teng 2010). The sociological antecedents of game continuance intention appear to be less defined and examined although some studies have tested the effects of social interaction with other players (Koo 2009, Wu et al. 2010).

The main objective of this study is to examine how a player’s network centrality in an online gaming community leads to the formation of online game continuance intention from a social capital perspective. This study also takes a player’s non-guild interaction into account by following the dichotomy of internal and external social capital (Adler and Kwon 2002, Stam and Elfring 2008). We believe that the sociological approach will become an important stream that contributes to the research field of online games. We expect this perspective not only to enhance our understanding of the formation of players’ continuance intention toward an online game through the identification of their social capital, but also to offer a helpful way for MMOG companies to improve customer retention.

This study is organized as follows: First, the literature on online gaming communities and social capital theory is reviewed. Then, we present our research framework, hypotheses, methodology, and results. Finally, this study concludes with theoretical and managerial implications, as well as research limitations.

2. Theoretical background

2.1. Online gaming communities: guilds

In MMOGs, the common networks of practice are called guilds. Guilds are online gaming communities of players who join together for instrumental or experiential purposes. For example, guild members can meet new friends, access within-guild resources, and share adventures and real-time information related to the game. With such positive expectations, players tend to participate and engage voluntarily in online gaming communities. These self-organized guilds become an intangible force that helps to bind a number of players together by transforming self-interest individuals into members of a community with shared goals and values (Mathwick et al. 2008). Guilds manifest the vitality of social dynamics in online games (Williams et al. 2006, Williams et al. 2007). Guild members are more willing to form groups and interact with each other, and stay longer in the game than players without affiliations (Ducheneaut et al. 2006).

However, multiple guild memberships are forbidden in an MMOG. That is, a player can belong to only one guild. When an actor becomes a member of a guild, he/she can communicate with other members via a guild chat channel. The shared channel is designed to facilitate guild activities and interaction among affiliated guildmates. Thus, membership exclusiveness provides a stable base for accumulation of social capital in online gaming communities. While there is ample opportunity for members of virtual communities to lurk and free ride, it is less possible to do so in online gaming communities because each player must present his/her characters and invest his/her resources to play an MMOG. However, guild membership exclusiveness does not prevent players from developing social links with members of other guilds. This leads to a salient distinction between a player’s social exchanges inside versus outside a guild. As mentioned previously, a player’s social ties to those from other guilds (i.e., non-guild interaction) are also important for the focal player to achieve his/her goals of high-level tasks in an MMOG.

Recent studies have examined the influence of social capital on user behavior in virtual communities (Wasko and Faraj 2005, Chiu et al. 2006, Wiertz and de Ruyter 2007, Mathwick et al. 2008). Previous MMOG research associated with social capital can be found in investigations of the social dynamics of guilds (Ducheneaut et al. 2007, Williams et al. 2006), the use of voice communication (Williams et al. 2007), player-to-player interaction (Ducheneaut and Moore 2004), social networking (Sherlock 2007), accumulation of cultural capital (Malaby 2006), collaborative game-playing (Nardi and Harris 2006), and leadership in MMOGs (Goh and Wasko 2009). To date, scant research has empirically examined the effects of a player’s community properties on his/her continuance intention toward online games. Williams (2006a) pointed out that “networked social games are a wholly new form of community, social interaction, and social phenomenon that is becoming normative faster than we have been able to analyze it, theorize it, or collect data on it” (p. 1). Therefore, we turn to the theory of social capital to elaborate the socially embedded nature of MMOGs.

2.2. Social capital theory

Social capital theory originates in community studies (Jacobs 1961). Recently, it has been applied to a wide range of social science arenas, including sociology (Granovetter 1973, Coleman 1988), organization management (Tsai and Ghoshal 1998, Nahapiet and Ghoshal 1998), consumer behavior (Frenzen and Davis 1990, Mathwick et al. 2008), and management information systems (Wasko and Faraj 2005, Chiu et al. 2006). Coleman (1988) refers social capital to any aspect of a social structure that creates value and facilitates the actions of the individual within that social structure. Nahapiet and Ghoshal (1998) define social capital as “the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (p. 234). Accordingly, Adler and Kwon (2002) suggest that social capital is an umbrella concept that encompasses not only the source from which it is derived, but also its relationships to a set of outcomes. For example, social capital may increase individuals’ resource accessibility (Seibert et al. 2001), facilitate mutual collaboration (Nahapiet and Ghoshal 1998), receive social support (Mathwick et al. 2008), reduce transaction costs (Putnam 1995), and lower turnover rates (Krackhardt
3. Research framework and hypotheses

Fig. 1 illustrates the model of social capital and game continuance intention tested in the current study. According to social capital literature (Adler and Kwon 2002, Putnam 2000), we identify a player’s network centrality and non-guild interaction as internal and external social capital in the context of online gaming communities. In our model, these measures of social capital generate two types of network values: access to within-guild resources and perceived game enjoyment. These values serve as mediating mechanisms between players’ social capital and MMOG attitudes, which in turn lead to players’ continuance intentions toward the MMOG.

3.1. A player’s network centrality and non-guild interaction

In this study, a player’s network centrality represents the structural facet of social capital (Tsai 2000, Sparrowe et al. 2001, Klein et al. 2004, Stam and Elfring 2008). Individuals who occupy the central positions in a social group have a number of direct connections to other members (Wasko and Faraj 2005). These ties become an invisible force that bonds focal individuals to other members in the network. Since a dense network requires a greater investment of time and energy, actors must devote their social energy to the network to maintain their social centrality. Their decision to allocate their finite time and energy to the affiliated networks reflects the necessity of making trade-offs between intra- and extra-network ties (Podolny and Baron 1997, Putnam 2000). If players engage in developing a densely connected network, they are unlikely to employ their social efforts to interact with those outside their social systems.

This is especially obvious in the online gaming context, where it is commonly understood that “time is money.” Fees for gaming time are usually charged by subscription-based MMOGs. Thus, players must determine how to allocate their time and energy to develop social networks for their MMOG adventures. Since guilds provide a stable base for online gaming experiences, most activities and adventures are held in online gaming communities. Because online gaming behavior often involves uncertainty and risk, such as player opportunism, playing with guild members appears to be less uncertain than playing with non-affiliated players. Each player tends to expend more effort on interacting with guild members. While players can invest a large amount of social energy in their own guilds, they cannot simultaneously participate in other non-guild activities. Therefore, we hypothesize:

H1. Players’ network centrality will reduce their non-guild interaction.

3.2. A player’s network centrality and network values

Social capital theory indicates that an individual’s network position within a social system can create helpful benefits for the actor (Coleman 1988, Nahapiet and Ghoshal 1998, Tsai and Ghoshal 1998). With its growth, a social network will accumulate various tangible and intangible resources that are shared by its members. Actors with higher centrality in a social network often have higher degrees of power, influence, and control over resources (Brass 1984, Burt 1982, Ibarra 1993). Thus, central positions allow these actors to garner more legitimacy to access resources from their networks.
Online gaming communities facilitate the accumulation of concrete and abstract resources in MMOGs. In guilds, players with different skills, capabilities, and knowledge can offer various kinds of resources to other members. Those players who occupy in the central positions have strong and close ties to each member of the guild (Wasko and Faraj 2005). It is easier for them to attain these helpful resources from their social bonds. In addition, there is a guild bank or storage to collect valuable goods, materials, and resources deposited by its members. The actor in the central position of a guild (e.g., the guild leader) often has higher power to allocate and withdraw these resources (Burt 1982). Since centrally located members possess more resources for their adventures, they often receive better items or equipment for their successes in high-level challenges. Thus, we hypothesize:

H2. Players’ network centrality will be positively related to their access to within-guild resources.

Perceived enjoyment is a key intrinsic motive for playing an online game (Holbrook et al. 1984, Deci and Ryan 1985). It refers to the hedonic aspect of playing the game (van der Heijden 2004). This study suggests that guilds frame a player’s hedonic experience by providing a social backdrop to numerous gaming activities. According to social capital research (Coleman 1988, Tsai and Ghoshal 1998), an actor occupying a central location in a social interaction network is likely to be perceived as trustworthy by other members in the network. The central player is likely to be the leader among members and to be the first to initiate group activities for new challenges and adventures. Fresh gaming experiences can lower these central players’ feelings of boredom from repetitive in-game activities, thus increasing their perceived enjoyment of the MMOG.

In addition to providing diverse gaming challenges, social interaction with network members also provides a source of enjoyable experiences (Sherlock 2007). Virtual communities often begin to form a social core and offer camaraderie to their members (Balasubramanian and Mahajan 2001), and friendship experiences are an important source of happiness (Myers 2000). Because the function of guilds is to meet new friends and enhance online gaming experiences, the central members who closely relate to other guildmates possess more social companionship and receive positive game enjoyment from their communal ties (Cova 1997). Thus, we hypothesize:

H3. Players’ network centrality will be positively related to their perceived enjoyment.

3.3. Non-guild interaction and network values

When players frequently interact with those outside the guild, they develop bridging relationships between their guilds and other non-affiliated players. A player’s non-guild interaction represents his/her external social capital in a guild (Putnam 2000, Adler and Kwon 2002). However, dense interaction with individuals outside their social networks may erode players’ relationship strength with affiliated members due to the players’ limited social time and energy. These players are unlikely to achieve control of resource accessibility from their own networks (Burt 1982).

With respect to MMOGs, guilds provide the stability of member relationships to reduce uncertainty and risk within online games. Social capital literature has indicated that individuals who have dense connections in a network are considered trustworthy (Granovetter 1973). Trustworthiness is helpful in increasing resource accessibility and exchange in the networks (Tsai and Ghoshal 1998). However, members who engage in non-guild interactions tend to occupy a peripheral position in their guilds. Guildmates may avoid exchanging valuable resources with peripheral members, who may lack trustworthiness. Although these players may receive support from non-guild interactions, their access to resources from their own guilds will be limited. Therefore, we hypothesize:

H4. Players’ non-guild interaction will reduce their access to within-guild resources.

This study, however, proposes that players’ non-guild ties will increase their enjoyable experiences in an MMOG. Social capital theory suggests that strong ties within one’s social network create the condition of information redundancy (Granovetter 1973, Burt 1992). The information possessed by any member within the network is likely to be shared quickly and to be redundant with information that other members already know. Therefore, an individual’s ties with other networks often become a bridge between densely interconnected social networks and thus provide unique information, resources, and idea sharing (Adler and Kwon 2002, Putnam 2000). Social capital research indicates that these ties play a special role in an actor’s opportunity for mobility and help him/her to obtain new work experiences (Granovetter 1995, Lin and Dunin 1986).

In a similar vein, players who frequently engage in activities with guild members may encounter the redundancy of repetitive information and experiences. They are less likely to receive helpful information and exciting experiences from their own guild. Instead, their ties outside the guild can result in new information sharing and diverse gaming experiences. Such network properties allow players better access to different game adventures and opportunities. Greater attainment of adventuring experiences that meet their role abilities and properties increases enjoyable perceptions of the MMOG. Therefore, we hypothesize:

H5. Players’ non-guild interaction will be positively related to their perceived enjoyment.

3.4. Network values and attitude toward playing an MMOG

Compared to other forms of media entertainment, computer games include numerous tasks and stressful events, and they often require that various skills and resources are used effectively (Klimmt and Hartmann 2006, Gist and Mitchell 1992). Since the difficulty of game challenges is given, an individual’s abilities to play an online game include not only skills and knowledge of an MMOG, but also relevant in-game resources that empower the focal character. Although game skills and knowledge can be learned and acquired easily, beneficial in-game resources may be scarce and difficult to obtain. Therefore, guilds often serve as important sources of valuable resources for affiliated players.

Furthermore, the amount of resources one needs to succeed in a task can generate a sense of self-efficacy (Bandura 1988, Gist and Mitchell 1992). Self-efficacy refers to “beliefs in one’s capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands” (Wood and Bandura 1989, p. 408). The more resources players obtain from their guilds, the more their self-efficacy will be enhanced. While facing and taking high-level challenges in an online game, such self-efficacy is likely to increase players’ confidence and reduce their frustration and anxiety (Klimmt and Hartmann 2006), leading to a state of enjoyment (Csikszentmihalyi 1977). Therefore, players with higher access to resources from their own guilds will have more opportunities to experience new adventures. These challenges strengthen their play experiences in an MMOG. Thus, we hypothesize:
H6. Players’ access to within-guild resources will be positively related to their perceived enjoyment.

In this study, attitude toward playing an MMOG is defined as an individual’s positive or negative feelings about playing an MMOG (Fishbein and Ajzen 1975). We expect that players’ access to within-guild resources will relate positively to their attitude toward playing an MMOG. An individual’s access to resources can increase his/her reputation in an organization (Kilduff and Krackhardt 1994). When a player has greater access to resources in a guild, he/she may have a higher degree of guild reputation and be likely to enjoy feelings of self-actualization and achievement in a given MMOG (Maslow 1954). This results in his/her positive attitude toward the game. On the other hand, social capital literature notes that an actor can fulfill his/her instrumental goals through those resources obtained from a network (Lin et al. 1981). A player who lacks resources is likely to perform his/her tasks poorly and thus hinder teammates from completing their own work (Sparrowe et al. 2001). In contrast, greater access to resources can improve a player’s personal performance and increase his/her likelihood of achieving the goals of game tasks, thereby yielding positive emotions toward playing the game. Therefore, we hypothesize:

H7. Players’ access to within-guild resources will be positively related to their attitude toward playing an MMOG.

Online gaming involves one’s investment of time in activities that produce experiences enjoyed for their own sake (Holbrook et al. 1984, Deci and Ryan 1985). Perceived enjoyment serves as a type of hedonic value that affects an individual’s attitude and intention toward using information technology (Dabholkar and Bagozzi 2002, van der Heijden 2004). Following social capital theory (Coleman 1988), this study suggests that social capital in a guild can help a player realize hedonic value, which in turn leads to his/her favorable feelings toward an online game. Prior research has found that such hedonic experience is a significant antecedent of attitude toward playing an online game (Wu and Liu 2007, Lee 2009). Thus, we hypothesize:

H8. Players’ perceived enjoyment will be positively related to their attitude toward playing an MMOG.

3.5. Attitude and continuance intention toward playing an MMOG

As mentioned previously, social capital can facilitate an individual’s action through the creation of network values (Coleman 1988, Adler and Kwon 2002). Since people tend to perform behaviors that align with their attitudes (Fishbein and Ajzen 1975), players are more likely to take positive actions toward an MMOG when they have favorable game attitudes as a result of attaining network values in their guilds. Prior studies have supported a positive relationship between attitude toward playing an online game and intention to play it (Hsu and Lu 2004; Wu and Liu 2007, Lee 2009). Therefore, we hypothesize:

H9. Players’ attitude toward playing an MMOG will be positively related to their continuance intention to play the MMOG.

4. Method

4.1. Research setting and samples

This study was conducted in Taiwan, where World of Warcraft (WOW) was selected as the research setting for data collection. WOW is a 3-D MMOG launched by Blizzard Entertainment Co. in 2005. Unlike free MMOGs, a monthly subscription is required for each player to access WOW. It had reached 12 million subscribers worldwide by October 2010 (Blizzard Entertainment 2010), exceeding 50% of the global online game market. WOW had also launched versions in several languages, including English and Chinese. In Taiwan, WOW is also the favorite MMOG, with more than 300,000 players. Players actively engage in game activities in their guilds by seeking more game-playing goals and experiences in WOW.

WOW players with frequent playing experience with a game role in a specific guild during the most recent two months were the research participants for this study. Despite that players can create more than one game character in a given account, the role-specific network characteristics and social resources are not equal because an individual is not allowed to play more than one role simultaneously. To accommodate this, we followed the egocentric approach to collect role-level data (Goh and Wasko 2009). This approach is used commonly in social capital research (Burt 1992, Podolny and Baron 1997), and it is also similar to the approach used in several virtual community studies (Ahuja et al. 2003, Wasko and Faraj 2005). The role identified was the representation of the focal player in WOW.

To recruit voluntary participants, we posted a recruitment statement on three WOW-related online forums. This is an effective means of inviting voluntary participation because WOW players usually visit online forums to seek or share game information.

Two recruitment standards, role-specific guild membership and recent two-month playing experience, were listed in the statement. Qualified participants were asked to answer an electronic questionnaire by connecting to the survey website. At the beginning of the questionnaire, participants identified their most frequently played role first and then continued to complete the resulting questions. Their responses were automatically saved to the database when they completed the questionnaire. While we received more than 1000 visits to the survey website, only 392 respondents attempted to answer the questionnaire. We dropped 45 invalid cases, so a total of 347 respondents completed the questionnaire successfully. All of these respondents met our data collection criteria.

4.2. Measures

For most of the constructs considered, established scales were used and modified to accommodate the research context. All self-reported scales were measured at the role level and are listed in Appendix A.

Based on the definition of network centrality in previous work (e.g., Wasko and Faraj 2005, Stam and Elfring 2008) and in-depth interviews with five WOW players, four items were developed to assess the degree of a player’s network centrality in a guild on seven-point Likert scales (from strongly disagree to strongly agree). Unlike single-item sociometric measures used in network research literature, our multi-item approach provided evidence of construct validity. A preliminary scale was pretested with 36 players. Internal consistency and item-to-total correlations were satisfactory (alpha = 0.92).

For non-guild interaction, three items were modified from Stam and Elfring (2008) and Chiu et al. (2006) to assess the extent of a player’s social activities with those from other guilds, including (1) the frequency of playing together with non-guild players, (2) the frequency of participating in non-guild activities, and (3) the time proportion of interaction with non-guild players when playing online. The 7-point scales were anchored by extremely low and extremely high.

The measure of access to within-guild resources was adapted from Spreitzer (1996), whereas the construct of perceived enjoyment was taken from Babin et al. (1994) and Dabholkar and
4.3. Data analysis

Data analysis followed the two-step procedure recommended by Anderson and Gerbing (1988). First, confirmatory factor analysis (CFA) was used to assess construct validity in the measurement model. Then, the full structural model was estimated to test our hypotheses. All models were performed by using AMOS 5.0 (Arbuckle 2003).

5. Results

5.1. Measurement model assessment

In order to assess the uni-dimensionality of the scales, CFA was used to evaluate our measurement model, construct validity and reliability. The results revealed that the overall fit of the measurement model was $\chi^2 (155) = 413.86;$ CFI = 0.95; NFI = 0.92. These fit indexes all exceeded the recommended 0.90 levels (McDonald and Marsh 1990, Hu and Bentler 1995). The Root Mean Square Error of Approximation (RMSEA) (0.069) is lower than 0.08 as suggested by Steiger (1990). Therefore, the overall model fit is acceptable.

According to Anderson and Gerbing (1988), convergent validity can be assessed by examining whether indicator loadings are significant. As shown in Appendix A, all loadings are significant for their underlying construct. Thus, convergent validity of the measurement model is reasonable. Cronbach’s alpha coefficients for each construct are higher than 0.83, indicating satisfactory reliability (Nunnally 1978).

Two tests were used to evaluate discriminant validity in this study. First, the values of average variance extracted (AVE) for each construct should exceed the squared correlations of all construct pairs (Fornell and Larcker 1981). The results shown in Table 1 demonstrate that the square roots of AVE for each construct are greater than the correlation coefficients of all pairs. Second, discriminant validity can also be determined if the confidence interval of correlations between two constructs includes 1 (Fornell and Larcker 1981). Among our 15 pairwise correlations, no confidence interval of any pair (Fornell and Larcker 1981) includes 1 (Smith and Barclay 2006). The results showed that the one-factor model fit the data poorly, $\chi^2 (161) = 435.55;$ CFI = 0.95; NFI = 0.92; RMSEA = 0.070. The results were similar to the measurement model, exceeding acceptable levels. Table 2 lists the standardized path coefficients and associated t-values for all relationships in the structural model.

H1 predicted that players’ network centrality will reduce their non-guild interaction, and H2 and H3 stated that players’ network centrality will be positively related to their access to within-guild resources and perceived enjoyment, respectively. The results revealed that a player’s network centrality has a significant and negative influence on non-guild interaction ($\gamma = -0.35, p < 0.01$). It also positively affects access to resources ($\gamma = 0.36, p < 0.01$). However, the relationship between a player’s network centrality and perceived enjoyment is not significant ($\gamma = 0.04, n.s.$). Therefore, H1 and H2 are supported by the data, but H3 is not.

We hypothesized that players’ non-guild interaction will be negatively related to access to within-guild resources (H4) and positively associated with perceived enjoyment (H5). As expected, the smaller rank number implies the more central position in the guild. For example, rank 1 is the position of the guild leader. A high and negative correlation between the subjective and objective data indicates that our self-reported scale is adequate to reflect the degree of a player’s centrality in an online gaming community. Pearson’s correlation analysis showed that a player’s network centrality correlated with guild rank highly and significantly ($r = -0.54, p < 0.001$). Therefore, we believe that our measurement is well established and able to capture the concept of a player’s network centrality.

Because we collected data on both independent and dependent variables from a single source, the players, the potential for common method variance might exist. To address this, we used Harman’s single-factor test (Podsakoff et al. 2003) and conducted a CFA by loading all indicators on one factor. The use of CFA represented a more sophisticated test (Podsakoff and Organ 1986). In the CFA approach, a substantial amount of common method variance is present if the single-factor model fits the data (Malhotra et al. 2006). The results showed that the one-factor model fit the data poorly, $\chi^2 (170) = 2822.61;$ CFI = 0.47; NFI = 0.45; RMSEA = 0.212, whereas the six-factor model fit was significantly better ($p < 0.001$). Thus, we can conclude that common method bias is not serious in this study.

Finally, we evaluated the adequacy of sample size according to Westland’s (2010) suggestions. The results showed that our sample size greatly exceeded the sample bound which was determined either (1) by the ratio of indicator variables to latent constructs (sample size needed = 156) or (2) by minimum effect, power and significance (sample size needed = 84). Hence, the sample size of this study is adequate for structural equation modeling.

5.2. Hypothesis testing

We tested each hypothesis by examining structural path significance. The overall fit of the full structural model was $\chi^2 (161) = 435.55; CFI = 0.95; NFI = 0.92; RMSEA = 0.070.$ The results were similar to the measurement model, exceeding acceptable levels. Table 2 lists the standardized path coefficients and associated t-values for all relationships in the structural model.

Table 1

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>SD</th>
<th>1.</th>
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<tr>
<td>1. A player’s network centrality</td>
<td>3.54</td>
<td>1.70</td>
<td>(0.87)</td>
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<td>2. Non-guild interaction</td>
<td>4.54</td>
<td>1.27</td>
<td>-0.32 **</td>
<td>(0.79)</td>
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<td>3. Access to within-guild resources</td>
<td>4.90</td>
<td>1.29</td>
<td>0.41 **</td>
<td>-0.37 **</td>
<td>(0.82)</td>
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<tr>
<td>4. Perceived enjoyment</td>
<td>5.69</td>
<td>0.78</td>
<td>0.12</td>
<td>0.05</td>
<td>0.18</td>
<td>0.77</td>
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<tr>
<td>5. Attitude toward playing an MMOG</td>
<td>5.97</td>
<td>0.80</td>
<td>0.15</td>
<td>0.06</td>
<td>0.23</td>
<td>0.72</td>
<td>(0.90)</td>
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<tr>
<td>6. Continuance intention to play the MMOG</td>
<td>5.79</td>
<td>0.84</td>
<td>0.18</td>
<td>0.03</td>
<td>0.19</td>
<td>0.64</td>
<td>0.71 **</td>
<td>(0.80)</td>
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Note: Values in the parentheses on diagonal are the square roots of averaged variance extracted.

** $p < 0.05.$

** $p < 0.01.$
non-guild interaction has a negative effect on access to resources ($\gamma = -0.22, p < 0.01$) and a positive impact on perceived enjoyment ($\gamma = 0.17, p < 0.01$), supporting H4 and H5. Additionally, H6 predicted that players’ access to resources will be positively related to their perceived enjoyment. The results showed that access to resources has a positive impact on perceived enjoyment ($\gamma = 0.26, p < 0.01$), supporting H6.

Finally, consistent with H7, H8, and H9, players’ access to within-guild resources ($\gamma = 0.10, p < 0.01$) and perceived enjoyment ($\gamma = 0.81, p < 0.01$) positively influence their attitude toward playing an MMOG, which in turn positively affects their continuance intention to play the MMOG ($\gamma = 0.80, p < 0.01$). Thus, H7, H8, and H9 receive empirical support.

6. Discussion and implications

The purpose of this study is to investigate how a player’s network centrality within an online gaming community affects the formation of game continuance intention from the perspective of social capital theory. Based on two important types of social connections in an MMOG, we identify a player’s network centrality and non-guild interaction as his/her internal and external social capital in an online gaming community. Overall, the results confirm that a player’s network centrality attenuates his/her interactions with players from other guilds. More importantly, our results indicate different effects of internal and external social capital on network consequences. On one hand, a player’s network centrality has a positive effect on access to within-guild resources, but no direct effect on perceived enjoyment. On the other hand, the player’s non-guild interaction has a negative influence on access to within-guild resources, but a positive influence on perceived enjoyment. Both access to resources and perceived enjoyment have positive impacts on players’ attitude toward playing an MMOG, which in turn affects their continuance intention to play the MMOG.

This study contributes to existing MMOG and online community literature in several respects. It is the first to examine the effects of structural social capital in the MMOG context. To capture a player’s internal social capital in an online gaming community, we developed a self-reported measure to assess the extent of a player’s network centrality. Our results indicate that a player’s network centrality in a guild helps the focal player obtain within-guild resources and assistance required for game adventures. In line with social capital literature (e.g., Colman 1990, Nahapiet and Ghoshal 1998), we provide additional support for the emphasis on network position that facilitates an actor’s access to resources in MMOGs. Central players are likely to have numerous strong ties to other guildmates who tend to provide valuable resources and in-game support for them.

Surprisingly, the effect of a player’s network centrality on perceived game enjoyment is not supported. This unexpected result somewhat echoes the notion that social capital is not always beneficial (Nahapiet and Ghoshal 1998). One possible reason is that the high level of network centrality is likely to yield redundancy of game experiences. Because central players are at the core of numerous guild activities, they might have experienced a variety of game challenges and team plays with their guildmates. If the same challenges are frequently repeated, fun-seeking behaviors turn into routine jobs. Therefore, such repetitive experiences might reduce the magnitude of playfulness and lead to feelings of boredom. If online game service providers promote the guilds of practice strongly, this study indicates that a dilemma of network centrality might occur. Thus, future research might further explore the phenomenon of experience redundancy.

Second, it is difficult for players to simultaneously balance their intra- and extra-guild interaction in an MMOG. When most of their social energy is devoted to boundary-spanning activities, players may become peripheral members in their guilds and lose their control and trustworthiness to attain network resources from other members (Ibarra 1993). However, the results show that non-guild interaction is positively associated with perceived game enjoyment. Previous research has suggested that an individual’s bridging to two social systems is beneficial (Burt 1992, Geletkanycz and Hambrick 1997). An MMOG provides an appropriate context to examine the effect of one’s bridging social ties. This study indicates that a player’s linkages to those from other guilds provide the focal actor with more opportunities to seek different game adventures and experiences. Therefore, future research is recommended to investigate the effects of a player’s non-guild interaction on other types of benefits in MMOGs.

Third, we confirm that players’ access to within-guild resources is the determinant of their positive experiences and attitudes toward an MMOG. These results support our suggestion for resource accessibility in MMOGs. In-game resources acquired from online gaming communities will increase players’ self-efficacy (Bandura 1988, Gist and Mitchell 1992). Such self-efficacy can improve players’ performance and affect their emotions positively when they accept different challenges in an MMOG. Meanwhile, players can receive social power and personal achievement by possessing greater in-game resources. The higher the level of reputation and self-actualization players achieve in the MMOG, the more favorably they feel and act toward the game.

Fourth, our findings provide supports for the positive influence of perceived enjoyment on players’ attitude toward an MMOG. Perceived enjoyment is an intrinsic motivation that affects the use of MMOGs (Wu and Liu 2007, Koo 2009; Lee 2009). When entering an MMOG, players can create fictitious roles in a fantasy world for the purpose of fun seeking. As long as players feel that an MMOG is interesting and playful, their attitudes toward the game will be favorable, and they will engage in playing it. On the other hand, our results confirm the sociological determinants of perceived enjoyment in an MMOG. The source of game enjoyment has been
less examined in past research. Since enjoyment is an important element of online gaming, future research can examine other potential factors that determine perceived game enjoyment.

From a practical perspective, our findings have several managerial implications for online game service providers. First, we find that a player’s network centrality in a guild is quite beneficial even though it may reduce his/her non-guild interaction. Since senior players often have a higher level of network centrality based on a history of social interaction with guildmates than junior players, we suggest that MMOG companies can implement a mentor system in the guilds of practice. In the mentor system, senior guild members should take responsibility for helping junior members overcome guild-based challenges. Through frequent collaboration and participation in diverse activities within their guilds, both junior and senior members’ perceived network centrality can be improved. As a result, they will be more likely to increase their game continuance intention.

Second, when promoting players to organize their own guilds or possess guild memberships, online game service providers should encourage players to develop their social ties to members of other guilds. In comparison to a player’s network centrality, we find that one’s social ties to players from different guilds have a direct effect on game enjoyment. For example, companies can create interesting tasks or adventures that require cooperation among non-affiliated players or between members of different guilds for completion. Such design allows players to know and learn from unfamiliar partners, increase their game enjoyment, and then improve their game attitude.

Third, MMOG companies should facilitate guild members in sharing or exchanging their in-game resources to foster better gaming experiences and attitudes. Because players often act in their own self-interest, it may be less possible for them to share valuable resources. Online game companies need to establish adequate mechanisms to encourage players to share their resources. For example, a guild bank is a common way to store and exchange resources donated by each member. Also, certain incentives and rewards can be designed to increase players’ willingness to share resources with guildmates. Sufficient resources for game adventures and challenges will improve players’ attitude toward the MMOG.

Finally, game enjoyment plays a crucial role in elevating players’ game attitude, which in turn improves their continuance intention in an MMOG. To create and maintain a playful world, MMOG companies often introduce and update game versions to make them novel and interesting. When an MMOG remains interesting and enjoyable, players’ attitude and continuance intention to play the online game will become positive.

7. Limitations and future research

Although our findings are encouraging and insightful, the present study has several limitations. One is that we used only WOW as the research target, even though WOW is adequate to test our model empirically due to its representativeness among MMOGs in Taiwan. The one-site survey is likely to control several interfering variables, but its generalization to other MMOGs may be limited. Future research could collect data from different MMOGs to evaluate the external validity of our results. A second limitation is that a player’s network centrality was measured directly by using social network analysis. This would be helpful in understanding and representing players’ structural configuration in their guilds. A third limitation is that this study was based on a cross-sectional design. As guilds are established in an MMOG, they are dynamic. They are likely to become larger, smaller, or be dismissed at some point in time. We recommend that a longitudinal study could investigate the evolution of social capital in a specific guild.

8. Conclusion

While the MMOG market is growing rapidly, the issue of online gaming communities and game continuance intention is seldom studied. To bridge this gap, this study applies social capital theory to investigate how a player’s network centrality and non-guild interaction (i.e., internal and external social capital) influence MMOG attitude and continuance intention. Based on prior research, we also identify two network values, access to within-guild resources and perceived enjoyment, to elaborate the dynamics of social capital in online gaming communities. Our results reveal that a player’s network centrality enhances resource accessibility from a guild, whereas non-guild interaction improves the level of online game enjoyment. Both values play mediating roles in the relationships between players’ social capital and attitude toward playing an MMOG, which in turn affect their continuance intentions to play the MMOG. As a result, this study provides empirical support for the vitality of social capital in an MMOG context. Online game service providers are encouraged to design mentor systems, team-play tasks, personal incentives, and novel adventures to improve the social and gaming experiences in MMOGs.

Appendix A. The measurement model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Standardized loadings</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A player’s network centrality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(α = 0.92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. In this guild, I am one of core members</td>
<td>0.93</td>
<td>Fixed</td>
</tr>
<tr>
<td>2. In this guild, I stay at the center of many activities</td>
<td>0.86</td>
<td>24.06</td>
</tr>
<tr>
<td>3. In this guild, my status is close to the center of the guild</td>
<td>0.93</td>
<td>30.02</td>
</tr>
<tr>
<td>4. Compared to other members, I feel less important in this guild</td>
<td>0.73</td>
<td>17.71</td>
</tr>
<tr>
<td>Non-guild interaction (α = 0.83)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Please rate the frequency of playing together with non-guild players when playing online</td>
<td>0.81</td>
<td>14.55</td>
</tr>
<tr>
<td>2. Please rate the frequency of participating in non-guild activities when playing online</td>
<td>0.86</td>
<td>14.55</td>
</tr>
<tr>
<td>3. Please rate the time proportion spent on interacting with non-guild players when playing online</td>
<td>0.69</td>
<td>12.69</td>
</tr>
<tr>
<td>Access to within-guild resources (α = 0.85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I can obtain the resources necessary to make my game-play smooth from the guild</td>
<td>0.87</td>
<td>Fixed</td>
</tr>
<tr>
<td>2. When I need additional resources,</td>
<td>0.91</td>
<td>19.41</td>
</tr>
</tbody>
</table>
Appendix A (continued)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Standardized Loadings</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can usually get them from the guild</td>
<td>0.68</td>
<td>13.83</td>
</tr>
<tr>
<td>3. Participating in this guild allows me to obtain better equipments and goods more easily</td>
<td>0.58</td>
<td>9.63</td>
</tr>
</tbody>
</table>

**Perceived enjoyment (α = 0.85)**

1. While playing XYZ, I feel excited | 0.62 | Fixed |
2. I find that XYZ is interesting | 0.92 | 13.20 |
3. Compared to other things I could have done, the time spent on playing XYZ is truly enjoyable | 0.58 | 9.63 |
4. Playing XYZ is truly a joy/pleasure | 0.91 | 13.28 |

**Attitude toward playing an MMOG (α = 0.93)**

1. I like playing XYZ very much | 0.94 | Fixed |
2. I feel good toward playing XYZ | 0.89 | 27.02 |
3. Playing XYZ is favorable | 0.87 | 25.40 |

**Continuance intention to play the MMOG (α = 0.83)**

1. In the future, I will continue to play XYZ | 0.93 | Fixed |
2. In the future, I will play XYZ often | 0.81 | 19.33 |
3. I will say advantages of XYZ to other people | 0.63 | 12.88 |

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* Reverse coding.

b XYZ was replaced by the target MMOG (i.e., WOW) in the questionnaire.

References


