臺大管理論叢 2015/6
第 25 卷 第 2 期 1-22
DOI: 10.6226/NTUMR.2015.Dec.0063

線上遊戲使用者間的社會網絡與持續使用意圖

Social Networking and Continuance Intention among Online Gamers

鄧景宜 / 長庚大學企業管理研究所教授
Ching-I Teng, Professor, Graduate Institute of Business and Management, Chang Gung University

黃翰忠 / 長庚大學企業管理研究所博士候選人
Han-Chung Huang, Ph.D. Candidate, Graduate Institute of Business and Management, Chang Gung University

陳貞菱 / 長庚大學工商管理學系碩士
Jen-Lin Chen, Master, Department of Industrial and Business Management, Chang Gung University

Received 2013/10, Final revision received 2013/12

摘 要

近幾年，線上遊戲市場成長相當迅速，過去研究發現社交是使用者參與線上遊戲的重要動機，但過去的文獻未充分說明社交網絡如何形成，以及如何進一步影響持續使用意圖。本研究以網路問卷的方式收集資料，有效問卷為 3,087 份，使用結構方程式進行分析。本研究發現線上遊戲使用者的社交能力與社交需求均與互賴及網絡融合有正向關係；此外，互賴與網絡融合均與持續使用意圖有正向關係。總之，社交能力與社交需求能激勵顧客創造社群與建立互賴的關係，有助於維繫持續線上遊戲的使用意圖。

【關鍵字】持續使用意圖、互賴、網絡融合

Abstract

The online gaming market is growing rapidly yet the available literature has not yet fully explained the formation of social networks in online games and how they impact gamers' continuance intention. Hence, this study examined how social ability and social needs are related to gamers' interdependence and network convergence, as well as how those factors are related to continuance intention. This study used online questionnaires to collect data. In total, 3,087 valid responses were collected and a structural equation modeling technique was used for analysis. Results indicated that social ability and social needs are positively related to gamer interdependence and network convergence, which are further positively related to continuance intention among gamers. Overall, social ability and needs motivate gamers to create communities and interdependent relationships with other gamers which help maintain a strong intention to continue gaming.

【Keywords】continuance intention, interdependence, network convergence

臺灣大學學術期刊資料庫

1. Introduction

Online games form a significant sector in modern economies. They are very popular, as evidenced by the record-breaking phenomenon that more than 3.3 million copies of a single version of an online game (i.e., World of Warcraft, Cataclysm) were sold within 24 hours (Blizzard Entertainment, Inc., 2011). Moreover, in 2011, the overall market size was estimated to have reached 29 billion (DFC Intelligence, 2011), indicating the relevance of research into online gamers.

Online gamers interact intensively and enjoy social interactions during gaming (Graham and Gosling, 2013; Griffiths, Davies, and Chappell, 2004). Such intense social interaction likely forms strong social networks that further fuel mutual social support and assistance among the members, and thus likely encourage strong intentions to continue gaming.

The pertinent literature on social networks in virtual communities indicates that network centrality can determine continuance intention among gamers (Hsiao and Chiou, 2012a). Moreover, online gaming with offline friends can enhance gamers' offline lives because of the ability to transfer in-game experiences into offline social networks (Snodgrass, Lacy, Dengah, and Fagan, 2011). Moreover, friends made in games (or online friends) can "migrate" to the offline world (Parks and Floyd, 1996), indicating the complexity of social network dynamics regarding online gaming. However, the literature has not examined why gamers form social networks and how these impact on continuance intention, indicating an unexploited research opportunity. Research filling this gap reveals the theoretical underpinnings of additional determinants of continuance intention among online gamers.

Hence, this study aimed to examine how online gamers establish social networks and how those networks fuel their continuance intention. To pursue this aim, this study consulted psychological theories regarding interpersonal relationships such as the relational cohesion theory (Lawler and Yoon, 1996), social penetration theory (Altman and Taylor, 1973), social capital theory (Coleman, 1990), identified gamer interdependence, i.e., the degree to which individuals in a relationship depend on each other (Parks and Floyd, 1996) and network convergence, i.e., the degree to which two or more networks overlap (Parks and Floyd, 1996) as important characteristics of social networks. Moreover, this study consulted the psychological theories of online environments (e.g., Graham and Gosling, 2013; Preece, 2000) and identified social ability and social needs as potential facilitators in the building of social networks.

Specifically, the goal of this study is to examine whether social ability and social needs

臺灣大學學術期刊資料庫

are positively related to interdependence and network convergence, and whether interdependence and network convergence are positively related to continuance intention among gamers.

Hsiao and Chiou (2012a) used social capital theory to investigate how network centrality determined user intention to repeatedly play online games. Their study was innovative in applying social capital theory to explain how social aspects impact gaming intention. The present study also examined how social aspects impact gaming intention but used two novel constructs, i.e., interdependence and network convergence, to address this issue. These provide new research opportunities for future studies on this issue. Chang and Zhu (2012) examined how social capital increases user intention to use social networking sites. They found the positive impact of social capital on intention and satisfaction. Similarly, the present study addressed how social capital impacts the intention to use networking sites but introduced two alternative theories, i.e., relational cohesion theory (Lawler and Yoon, 1996) and social penetration theory (Altman and Taylor, 1973), in addition to social capital theory, to explain how social capital impacts usage intention.

2. Literature Review

2.1 Continuance Intention and Social Networks

Continuance intention is a user's tendency to use the target information system again and it is typically interchangeable with loyalty (Chiu and Wang, 2008). The literature on information systems frequently uses the term "continuance intention", and thus the present study adopts it. Continuance intention is determined by numerous factors, including satisfaction, fairness (Chiu, Chiu, and Chang, 2007), interaction quality (Jha, Deitz, Babakus, and Yavas, 2013), usefulness, satisfaction with initial use (Bhattacherjee, 2001), performance expectancy, effort expectancy (Chiu and Wang, 2008), information quality, system quality (Roca, Chiu, and Martínez, 2006), and (firm-customer) relationship commitment (Vatanasombut, Igbaria, Stylianou, and Rodgers, 2008). In online games, continuance (or loyalty) is determined by a sense of control, perceived entertainment, and challenge (Huang and Hsieh, 2011). However, the above online gaming literature provides little information about gamer community and social network issues, indicating the need for further research into this issue.

Recent literature began to focus on gamer community and social network issues. Gamers were observed to integrate their gaming into their daily lives (Hussain and Griffiths,

臺灣大學學術期刊資料庫

2009), indicating the likelihood that offline friends were playing online games with them, i.e., network convergence. Gaming with offline friends likely enhances gamers' offline lives (Snodgrass et al., 2011); the reason possibly being that "Playing WOW (World of Warcraft), a popular online game, allows gamers to transfer in-game accomplishments and experiences into offline social networks" (Snodgrass et al., 2011).

In addition to network convergence, challenges encountered in games likely drive gamers to partake in teamwork and to depend on each other to obtain gaming achievements, a form of interdependence. Interdependence is observed as a key for gamers to overcome challenges and lead them to continue gaming (Teng, Chen, Chen, and Li, 2012). Recent studies on social networks also support the critical role of interdependence in determining continuance intention. Position in an online gaming community influences community trust and social value, subsequently influencing the gamers' continuance intention (Hsiao and Chiou, 2012b). Moreover, network centrality provides gamers with access to resources that create gaming enjoyment, fueling gamers' continuance intention (Hsiao and Chiou, 2012a). In sum, network convergence and interdependence are two important characteristics of gaming social networks that likely nurture continuance intention, supporting the inclusion of these two factors in this study.

Previous studies have widely used self-administrated questionnaires to measure continuance intention in online systems. Specifically, Wangenheim and Bayón (2004) used self-administrated questionnaires to assess the willingness to pay more and a low intention to switch to another game. Tsai and Huang (2007) used items assessing repurchase intention. Furthermore, Lu and Wang (2008) used items assessing intention to reuse online games. Hence, consistent with the literature, this study also used self-administered questionnaires.

2.2 Interdependence and Network Convergence

Interdependence is the degree to which individuals in a relationship depend on each other (Parks and Floyd, 1996; Teng et al., 2012), and is a natural phenomenon occurs in a relationship between two individuals (Kelley, 1979). In the gaming context, interdependence among group members is related to identification with avatars (Jin and Park, 2009) and continuance intention (or loyalty) (Teng et al., 2012), indicating the necessity of including interdependence to explain how social networks fuel continuance intention.

Network convergence is a term from telecommunication technologies (e.g., Chatterjee and Byun, 2002) referring to the phenomenon when two or more networks merge into one. Analogous with technology networks, social (or interpersonal) networks can also converge.

臺灣大學學術期刊資料庫

When individuals develop deep relationships, they introduce each other to their friends and family members, forming a common social network (Parks, 1995), that is, converging their social networks into one. In online communities, people "do not appear to draw a sharp boundary between relationships in cyberspace and those in real life" (Parks and Floyd, 1996). Online games serve as places for informal social interactions and interpersonal relationships (Steinkuehler and Williams, 2006), and thus likely serve as places where network convergence occurs.

2.3 Social Ability and Social Need

Online gamers need sufficient social ability in order to effectively interact with other gaming members. Therefore, social ability should be one influential factor in how well gamers do in gaming groups. High levels of social ability help individuals to be accepted in groups (Preece, 2000); social ability can therefore build strong interpersonal relationships in online games, supporting the relevance of social ability to online gamer behavior.

In addition to social ability, social need (need to be accepted and affiliated) is one of the main motivators of online gaming (Graham and Gosling, 2013). Social need is also one of the major needs of human beings, and thus vital to include in a study of this kind.

3. Hypothesis Development

3.1 Relational Cohesion Theory

Several psychological theories can be used to explain the hypotheses of this study. First, relationship cohesion theory (Lawler and Yoon, 1996) posits that continuous, positive interactions help build emotional connections. Such a process of relationship cohesion then formulates close interpersonal relationships. This theory is appropriate for explaining how social networks are built.

In online games, gamers typically do not play with each other face-to-face. Thus gamers need to have sufficient ability to feel what others feel, i.e., a high level of social ability. A high level of social ability can help an individual gain acceptance (Preece, 2000) and maintain continuous, positive interactions with others. In close relationships, individuals tend to respect partners' opinions, and this respect generates respect in return (Lawrence-Lightfoot, 2000), resulting in partners consulting each other when making decisions. Such a phenomenon is called interdependence (Parks and Floyd, 1996; Teng et al., 2012). Hence, this study hypothesizes that social ability is positively related to interdependence.

臺灣大學學術期刊資料庫

Social ability improves entrepreneurs' performance because it assists interactions with many different persons inside and outside the firm (Baron and Markman, 2003). Applying this finding to online gamers, gamers with good social ability are likely to successfully interact with many different people inside and outside their own social networks, assisting them in making friends from friends' networks. Making friends from friends' networks increases the overlap of one's own and one's friends' social networks, indicating increased network convergence (Parks and Floyd, 1996). Hence, this study hypothesizes that social ability is positively related to network convergence.

H1: Social ability is positively related to interdependence.

H2: Social ability is positively related to network convergence.

3.2 Social Penetration Theory

Social penetration theory (Altman and Taylor, 1973) posits that communication leads to a deeper relationship. Individuals have multi-layered information ranging from outer information such as appearance and behavior in public to inner information such as beliefs and fears. Social penetration theory posits that individuals exchange information to build relationships, and exchange outer information first followed by inner information (Altman and Taylor, 1973). The process of information exchange builds close interpersonal relationships. This theory depicts how individuals build interpersonal relationships and thus is a suitable basis for the development of this study's hypotheses.

Social needs include the needs to be accepted and affiliated, which motivate individuals to communicate with others to build interpersonal relationships. According to social penetration theory (Altman and Taylor, 1973), individuals who actively communicate or exchange information (from outer information to inner information) can build deeper relationships with others. Applying this proposition to online gamers, social needs motivate online gamers to communicate with other gamers, and eventually build deep relationships with them. Partners in a deep relationship have strong interdependence (Dwyer, Schurr, and Oh, 1987). Therefore, gaming partners who have strong social needs likely have strong interdependence, fueling the positive relationship between social need and interdependence.

Moreover, strong social needs motivate individuals to build interpersonal links with many people both inside and outside the originally owned social networks. When making friends from friends' social networks, gamers' social networks begin to overlap significantly with their gaming partners' social networks, indicating network convergence (Parks and Floyd, 1996). Hence, the present study hypothesizes a positive relationship between social

臺灣大學圖書館期刊資料庫

need and network convergence.

H3: Social need is positively related to interdependence.

H4: Social need is positively related to network convergence.

3.3 Social Capital Theory

Social capital theory (Coleman, 1990) posits that individuals establish affection for, and trust in, social structures that help them to obtain informal and valuable information. This theory can be used to explain how gamer interdependence fuels continuance intention. When online gamers deeply rely on their in-game friends, they have strong affection for, and trust in, the social structure of the game. According to social capital theory (Coleman, 1990), gamers can obtain informal and valuable information from their gaming social networks. Such valuable information can help gamers achieve gaming success and thus can serve as positive feedback which reinforces repeated gaming behavior. Therefore, this study hypothesizes a positive relationship between interdependence and continuance intention.

Similarly, gamers whose social networks have converged with the social network of their in-game friends tend to establish affection for and trust in their in-game friends in the converged social structure. According to social capital theory (Coleman, 1990), users can obtain informal and valuable information from numerous sources (i.e., other gamers). Such information helps gamers achieve gaming success and thus reinforces their repeated gaming behavior, motivating this study to hypothesize a positive relationship between network convergence and continuance intention.

Moreover, the investment model (Rusbult and Buunk, 1993) posits that partners in a relationship depend on the relationship more when they have invested important resources, e.g., have mutual friends. Network convergence indicates the degree to which partners have mutual friends (Parks and Floyd, 1996) and according to the investment model, network convergence should increase partners' dependency on the relationship. In online games, gamers' dependency on other gamers should result in their continued gaming behavior to stay connected with other gamers. Therefore, we can hypothesize a positive relationship between network convergence and continuance intention.

H5: Interdependence is positively related to continuance intention.

H6: Network convergence is positively related to continuance intention.

臺灣大學學術期刊資料庫

Figure 1 illustrates the research framework of this study.

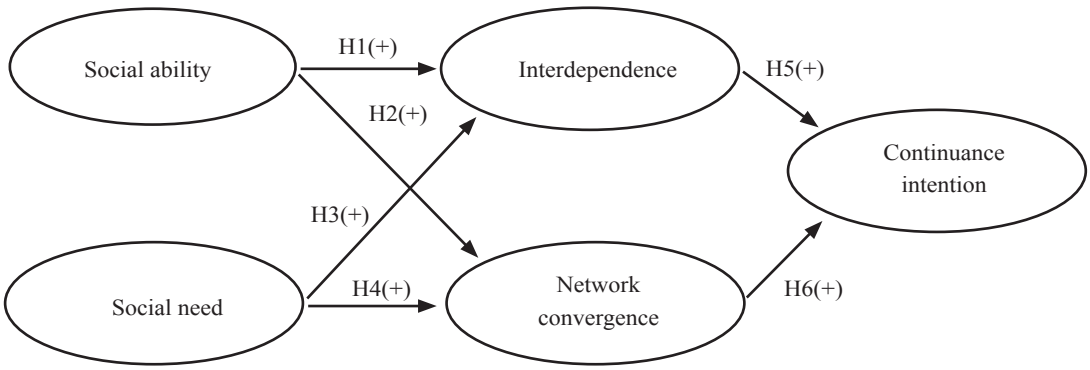


Figure 1 Research Framework

4. Methods

4.1 Sample and Data Collection Process

This study used a web form to collect data and invited online gamers to respond. Invitations were posted on 27 popular online gaming web forums. The data collection period started in November 2011 and ended in January 2012 (eight weeks). Using a web form to collect data regarding online games was reasonable since online gamers are accustomed to expressing themselves using computers. Moreover, this approach resulted in direct access to the intended study population (i.e., online gamers).

Six rigorous criteria were set for the elimination of invalid responses, increasing the data's validity. Table 1 lists the criteria for exclusion and the number of invalid responses. Notably, according to Progress in International Reading Literacy Study (2006), children under 10 years old are still developing reading skills and comprehension, so responses from gamers who were 10 years old and below were eliminated because such gamers might not have fully understood the study items. Multiple responses were determined by duplicate e-mail addresses in the data. In total, 3,424 online gamers submitted their responses, yielding 337 invalid responses and 3,087 valid responses, and subsequently a rate of 90.2%.

This study asked online gamers to answer questions about their favorite games. Table 2 lists their favorite games. We can observe that the top five popular games account for 72.5% of the gamers. Moreover, all the top 12 popular games involve frequent gamer encounters or interactions, indicating their suitability for inclusion in this study.

臺灣大學學術期刊資料庫

Table 1 Criteria for Exclusion and Number of Invalid Responses

Criteria for Exclusion of Invalid Responses	Number
1. Have not played online games in the past month	8
2. Identified non-existing game names or game characters as their favorites	13
3. Aged 10 years old and below	12
4. Submitted multiple responses	72
5. Submitted incomplete responses	131
6. Submitted same scores continuously for one fifth or more of the study items	101

Table 2 Favorite Games of Online Gamers

Game Name	Number	Percentage
Elsword	589	19.1%
League of Legends	560	18.1%
World of Warcraft	405	13.1%
Maple Story	343	11.1%
Ma9Ma9	342	11.1%
JX 3	77	2.5%
Mabinogi	58	1.9%
Crazy Racing	57	1.8%
Diablo 2	53	1.7%
Ragnarok Online	50	1.6%
Dragon Nest	46	1.5%
Lineage	42	1.4%
Others	465	15.1%

4.2 Measurement

The five items measuring social need came from the scale of Armeli, Eisenberger, Fasolo, and Lynch (1998). The five items measuring social ability came from Peterson and Seligman (2004). The four items measuring interdependence and the six items measuring network convergence came from the scale of Parks and Floyd (1996). The five items measuring continuance intention came from Zeithaml, Berry, and Parasuraman (1996). Item wording was slightly modified to fit the research setting, i.e., changed to suit the online gaming context. The response option ranged from 1 (very disagreeable) to 5 (very agreeable).

Items measuring each construct had a Cronbach's $\alpha > .82$, indicating sufficient reliability. Moreover, this study conducted a Confirmatory Factor Analysis (CFA) to directly assess reliability and validity. Composite Reliability (CR) for items measuring each construct

臺灣大學學術期刊資料庫

exceeded .85. Average Variance Extracted (AVE) for items measuring each construct exceeded .56, demonstrating acceptable reliability.

Furthermore, all items had indicator loadings > .64, indicating adequate convergent validity. Maximum squared correlation between each pair of constructs (.41) was below the minimum AVE (.56), indicating sufficient discriminant validity. Table 3 lists the CFA results. The fit indices of this study performed acceptably (χ^2 = 6037.38, *df* = 265, GFI = .86, NFI = .95, IFI = .96, CFI = .96, RMSEA = .087).

Table 3 Summary of Confirmatory Factor Analysis

Construct Items	λ	α	CI of α	CR	AVE
Continuance intention		.86	[.85, .86]	.89	.63
This game is my first choice.	.64				
I want to play this game more in the future.	.69				
I will say positive things about this game to other people.	.88				
I will recommend this game to someone who seeks my advice.	.90				
I will encourage friends and relatives to play this game.	.82				
Interdependence		.82	[.81, .83]	.85	.59
My in-game friend and I rely on each other.	.83				
My in-game friend and I consult each other before making decisions.	.81				
My in-game friend and I have strong influence on each other's decisions.	.72				
My in-game friend and I seek each other's opinions when encountering problems.	.71				
Network convergence		.89	[.88, .90]	.91	.62
My in-game friend and I have introduced each other to members of each other's circle of friends and family.	.75				
My in-game friend and I have introduced each other to our work associates.	.71				
My in-game friend and I contact many of the same people on the Net.	.85				
My in-game friend and I are involved with many of the same newsgroups and/or mailing lists.	.86				
My in-game friend and I have overlapping social circles on the Net.	.82				
My in-game friend and I have overlapping social circles outside of the Net.	.73				

臺灣大學學術期刊資料庫

Construct Items	λ	α	CI of α	CR	AVE
Social ability		.83	[.82, .84]	.86	.56
I am able to fit into any situation.	.73				
I have the ability to make others feel interested in me.	.80				
I understand others' way of thinking.	.68				
I get along well with people I have just met.	.76				
I am good at sensing what others are feeling.	.76				
Social need		.86	[.85, .87]	.89	.63
One of the most enjoyable things I can think of is just watching people and seeing what they are like.	.74				
I think being close to others, hearing them out, and relating to them on a one-on-one level is one of my favorite and most satisfying pastimes.	.84				
Just being around others and finding out about them is one of the most interesting things I can think of doing.	.89				
I feel like I have really accomplished something valuable when I am able to get close to someone.	.77				
I would find it very satisfying to be able to form new friendships with whomever I liked.	.71				

Note. *λ* denotes indicator loading; α denotes Cronbach's α value; CR denotes composite reliability; AVE denotes average variance extracted; CI denotes 95% confidence interval.

Table 4 lists the correlations among the study constructs. All constructs significantly correlated with each other, supporting the theory that this study should investigate how these constructs are related. Moreover, all correlations were below .64 and should be considered as low or moderately correlated, rather than highly correlated. Such low or moderate correlations preliminarily support the discriminant validity of the study measurement and the absence of Common Method Variance (CMV). To formally test CMV, this study adopted the suggestion of Podsakoff, Mackenzie, Lee, and Podsakoff (2003). One construct named as CMV was used to explain all constructs in the theoretical model. The model including CMV had a chi-square value of 6789.48 with 270 degrees of freedom. The model excluding CMV had a chi-square value of 4037.38 with 265 degrees of freedom. The chi-square difference was 2725.1 and the difference in degrees of freedom was five, exceeding the threshold value (chi-square = 11.07, $df = 5$). Therefore, the model excluding CMV statistically outperformed the model including CMV. That is, CMV is at its minimum in the measurement.

臺灣大學學術期刊資料庫

Table 4 Correlations among Study Constructs

	Mean	*SD*	1	2	3	4
1. Continuance intention	3.84	0.75	---			
2. Interdependence	3.59	0.73	.38**	---		
3. Network convergence	2.83	0.90	.27**	.47**	---	
4. Social ability	3.58	0.65	.33**	.46**	.37**	---
5. Social need	3.70	0.70	.34**	.49**	.35**	.64**

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

5. Results

5.1 Sample Characteristics

Table 5 summarizes the characteristics of the study sample. Among the sample, 84.4% of participants were male, 59.5% were 20 to 28 years old, and 60.2% had attended college or university. This study consulted related studies to examine whether the sample characteristics resembled those in the literature. In the literature, males comprised 58.8% (Yeh, 2012) to 88% (Griffiths et al., 2004) of online gamers. Such findings are consistent with the present study. In the literature, online gamers were, on average, 26.55 years old (Collins, Freeman, and Chamarro-Premuzic, 2012), also consistent with the present study.

Table 5 Sample Characteristics

Item	Category	Number	Percentage
Gender	Male	2606	84.4
	Female	481	15.6
Age	Younger than 20 years old	992	32.1
	20 to 22 years old	899	29.1
	23 to 25 years old	587	19.0
	26 to 28 years old	349	11.4
	Older than 28 years	260	8.4
Education	Primary school	31	1.0
	Junior high school	225	7.3
	Senior high school	587	19.0
	College or university	1858	60.2
	Graduate institute	386	12.5

5.2 Hypotheses Testing

This study used structural equation modeling to test the study hypotheses. The standardized path coefficients are listed in Figure 2.

臺灣大學學術期刊資料庫

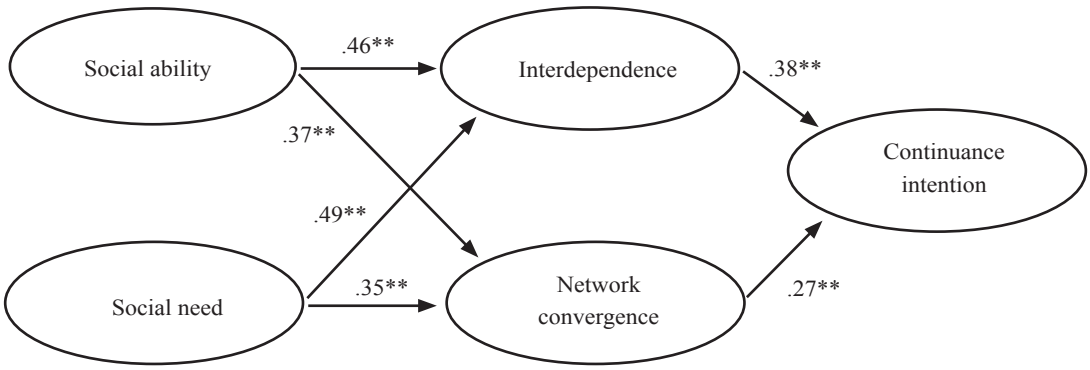


Figure 2 Standardized Path Coefficients of the Theoretical Model

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

Table 6 summarizes the results of hypotheses testing.

Table 6 Summary of Hypotheses Testing Results

Hypothesized Path	Hypothesized Direction	Result Direction	Standardized Path Coefficient
H1: Social ability → Interdependence	+	+	.46**
H2: Social ability → Network convergence	+	+	.37**
H3: Social need → Interdependence	+	+	.49**
H4: Social need → Network convergence	+	+	.35**
H5: Interdependence → Continuance intention	+	+	.38**
H6: Network convergence → Continuance intention	+	+	.27**

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

Social ability is positively related to interdependence (path coefficient = .46, $p < .01$), thus supporting H1. Social ability is also positively related to network convergence (path coefficient = .37, $p < .01$), thus supporting H2. Social need is positively related to interdependence (path coefficient = .49, $p < .01$), thus supporting H3. Social need is also positively related to network convergence (path coefficient = .35, $p < .01$), thus supporting H4. Interdependence is positively related to continuance intention (path coefficient = .38, $p < .01$), thus supporting H5. Eventually, network convergence is positively related to continuance intention (path coefficient = .27, $p < .01$), thus supporting H6. In the structural model of this study, most of the fit indices performed acceptably ($\chi^2 = 6491.38$, $df = 268$, GFI = .85, NFI = .95, IFI = .95, CFI = .95, RMSEA = .090).

臺灣大學法律期刊資料庫

6. Discussion

6.1 Main Findings

This study found that online gamers' social ability and social need are positively related to interdependence and network convergence which further increase gamer intention to continue gaming. Such findings can be explained by the literature of social ability and social needs. Specifically, social ability enables individuals to be accepted by other group members (Preece, 2000) and social need is the strong need of human beings driving individual behavior to build social networks (Teng and Chen, 2014).

6.2 Theoretical Implications

Parks and Floyd (1996) investigated how participants in online newsgroups form close relationships and whether such relationships migrate to other settings. They found evidence showing that individuals form interdependent relationships and such relationships can migrate to the offline world. The findings of Parks and Floyd (1996) are interesting and thus the present study investigated the next step: how do the interdependent and migrated (to the real world) relationships impact individual behavior? The present study is new to the literature in indicating that interdependence and network convergence can further strengthen online communities by encouraging an individual's continuous participation.

One recent study (Teng et al., 2012) found that gamers' interdependence was positively related to gamer loyalty (or continuance intention). Such a finding is in line with those of this study. However, the present study is novel in identifying network convergence as a predictor for continuance intention among gamers. That is, highly convergent social networks as well as strongly interdependent social networks can encourage members' continued participation in the social networks.

This study found that three theories, i.e., relational cohesion theory (Lawler and Yoon, 1996), social penetration theory (Altman and Taylor, 1973), and social capital theory (Coleman, 1990), can be used to explain how online gamers build their social network and how the social network impacts their intention to continue gaming. The present study is unique in introducing these theories to explain online gamer behavior and in integrating the three theories into one model. Such integration provides a comprehensive theory explaining both how social networks are formed (the front end) and how social networks impact members' behavior (the back end).

In social networking site settings, Chang and Zhu (2012) found that bridging social

臺灣大學學術期刊資料庫

capital is related to online user satisfaction and continuance intention. When regarding network convergence as a proxy for bridging social capital, this study is in line with Chang and Zhu (2012) in investigating the influence of bridging social capital on user behavior, but is unique both in the research settings (i.e., in online games) and in the perspective of conceptualizing bridging social capital (i.e., using network convergence).

In online gaming settings, Hsiao and Chiou (2012a) found that network centrality is related to perceived enjoyment and a positive attitude towards gaming, which further increase continuance intention. When regarding network convergence as a proxy for network centrality, the present study is in concordance with Hsiao and Chiou (2012a) in investigating how network centrality impacts continuance intention but differs by including interdependence, i.e., not only the network centrality but also the strength of interpersonal relationships in the network. Consideration of such strength breaks a new path for future studies.

The recent literature on information technology has argued that social usage can be one dimension for explaining continuous use of information systems (Nevo, Nevo, and Kim, 2012). The present study provides evidence supporting this argument by indicating that social factors can successfully explain continuance intention. The findings of this study may find application in vital sectors outside the gaming world. For example, social networking systems can help deliver healthcare to patients, improving their well-being (Gianchandani, 2011). The present study's indication that social networks can effectively encourage continuous use of systems, could be applied in a health setting to contribute to successful delivery of healthcare.

6.3 Implications for Practice

Findings of this study may help parents understand children's repeated gaming behavior which can result from social need and social ability. A child's social need can be met by participating regularly but not excessively in the social activities offered in online games. Therefore, parents and educators can encourage children to participate in meaningful social activities in online games, exercising the basic social abilities also needed in the real world. Social need is one of the basic human needs (Maslow, 1970). Therefore, limiting social time both in the virtual and real worlds likely starves a child's social need and cause tension in the parent-child relationship.

Knowing their children's motivations for continued gaming is a key to preventing them from engaging in excessive (harmful) gaming behavior. Since social need is one of the basic

臺灣大學學術期刊資料庫

human needs (Maslow, 1970), parents can offer alternative social activities to their children to reduce excessive gaming behavior.

Findings of this study also provide online game providers with insights into their users. First, this study found that online gamers' social ability is positively related to both interdependence and network convergence. Therefore, online game providers may consider designing their games to include a social learning environment for gamers to learn social ability from other gamers. For example, games can include tasks that require intensive teamwork. Moreover, games can include added functions for avatars (gamer representations in games) to easily express friendliness to other gamers. Gamers' gratification for social interaction likely fuels continuance intention (Wu, Wang, and Tsai, 2010).

This study also found that interdependence and network convergence positively contribute to continuance intention. Hence, game providers who hope to encourage continuous use among their users could regularly initiate social activities (such as celebration of holidays and funny contests). Game providers can also design game functions to encourage gamers to participate in guilds in which gamers can have a sense of affiliation and thus can make friends more easily. Through participation in guilds and social activities, gamers likely form close and interdependent relationships with other gamers (Hussain and Griffiths, 2009) (i.e., interdependence) and develop overlapping social networks (network convergence) that likely encourage their continuance of game use.

6.4 Research Limitations and Future Research Directions

Most online gaming studies (e.g., Chiu and Wang, 2008; Teng et al., 2012) have utilized the self-report method to collect data. One reason is that the data provided by online gamers themselves have substantial validity for evaluating their own psychological status. The present study also encounters such limitations which future studies could seek to overcome.

Online games have various genres. Some games emphasize gamers' interactions, e.g., Maginobi. In the game, gamers are required to interact with other gamers in order to complete tasks. For example, gamers need to collect various materials to make an artifact. Exchanging with gamers who have rare materials is an efficient method for completing this task. Other games (e.g., Crazyracer) may require a low degree of gamer cooperation. Each genre may have its unique features in social aspects, constraining one study from clarifying all of their unique features. The present study was not restricted to gamers from a single game, increasing the external validity of its findings. Future studies could focus on a single game and explore its unique features.

臺灣大學學術期刊資料庫

This study used items measuring interdependence and network convergence which are appropriate for answering the current research question. However, bonding and bridging social capital have covered a wide spectrum of interpersonal relationships, indicating their potential for the explanation of social benefits in online gaming. Further studies can utilize items measuring bonding and bridging social capital to form a comprehensive set of measures.

This study used questionnaires to collect data covering several games from a relatively high number of respondents. However, future research can use social network databases to show how social networks affect the frequency of system usage.

臺灣大學學術期刊資料庫

References

Altman, I., and Taylor, D. A. 1973. ***Social Penetration: The Development of Interpersonal Relationships***. New York, NY: Holt, Rinehart and Winston.

Armeli, S., Eisenberger, R., Fasolo, P., and Lynch, P. 1998. Perceived organizational support and police performance: The moderating influence of socioemotional needs. ***Journal of Applied Psychology***, 83 (2): 288-297.

Baron, R., and Markman, G. 2003. Beyond social capital: The role of entrepreneurs' social competence in their financial success. ***Journal of Business Venturing***, 18 (1): 41-60.

Bhattacherjee, A. 2001. Understanding information systems continuance: An expectation-confirmation model. ***MIS Quarterly***, 25 (3): 351-370.

Blizzard Entertainment, Inc. 2011. ***World of Warcraft®: Cataclysm™ shatters PC-game sales record***. http://us.blizzard.com/en-us/company/press/pressreleases.html?id=2847886. Accessed Dec. 13, 2011.

Chang, Y. P., and Zhu, D. H. 2012. The role of perceived social capital and flow experience in building users' continuance intention to social networking sites in China. ***Computers in Human Behavior***, 28 (3): 995-1001.

Chatterjee, S., and Byun, J. 2002. Network convergence: Where is the value?. ***Communications of the Association for Information Systems***, 9: 421-440.

Chiu, C. M., Chiu, C. S., and Chang, H. C. 2007. Examining the integrated influence of fairness and quality on learners' satisfaction and web-based learning continuance intention. ***Information Systems Journal***, 17 (3): 271-287.

Chiu, C. M., and Wang, E. T. G. 2008. Understanding web-based learning continuance intention: The role of subjective task value. ***Information & Management***, 45 (3): 194-201.

Coleman, J. S. 1990. ***Foundations of Social Theory***. Cambridge, MA: Belknap Press.

Collins, E., Freeman, J., and Chamarro-Premuzic, T. 2012. Personality traits associated with problematic and non-problematic massively multiplayer online role playing game use. ***Personality and Individual Differences***, 52 (2): 133-138.

DFC Intelligence. 2011. ***DFC intelligence forecasts worldwide online game market to reach $29 billion by 2016***. http://www.dfcint.com/wp/?p=307. Accessed Mar. 27, 2012.

Dwyer, F. R., Schurr, P. H., and Oh, S. 1987. Developing buyer-seller relationships. ***Journal of Marketing***, 51 (2): 11-27.

臺灣大學學術期刊資料庫

Gianchandani, E. P. 2011. Toward similar health and well-being: An implicit role for networking and information technology. ***Journal of Information Technology***, 26 (2): 120-128.

Graham, L. T., and Gosling, S. D. 2013. Personality profiles associated with different motivations for playing World of Warcraft. ***Cyberpsychology, Behavior, and Social Networking***, 16 (3): 189-193.

Griffiths, M. D., Davies, M. N. O., and Chappell, D. 2004. Online computer gaming: A comparison of adolescent and adult gamers. ***Journal of Adolescence***, 27 (1): 87-96.

Hsiao, C. C., and Chiou, J. S. 2012a. The effects of a player's network centrality on resource accessibility, game enjoyment, and continuance intention: A study on online gaming communities. ***Electronic Commerce Research and Applications***, 11 (1): 75-84.

_____. 2012b. The impact of online community position on online game continuance intention: Do game knowledge and community size matter?. ***Information & Management***, 49 (6): 292-300.

Huang, L. Y., and Hsieh, Y. J. 2011. Predicting online game loyalty based on need gratification and experiential motives. ***Internet Research***, 21 (5): 581-598.

Hussain, Z., and Griffiths, M. D. 2009. The attitudes, feelings, and experiences of online gamers: A qualitative analysis. ***CyberPsychology & Behavior***, 12 (6): 747-753.

Jha, S., Deitz, G. D., Babakus, E., and Yavas, U. 2013. The role of corporate image for quality in the formation of attitudinal service loyalty. ***Journal of Service Research***, 16 (2): 155-170.

Jin, S. A., and Park, N. 2009. Parasocial interaction with my avatar: Effects of interdependent self-construal and the mediating role of self-presence in an avatar-based console game, Wii. ***CyberPsychology & Behavior***, 12 (6): 723-727.

Kelley, H. H. 1979. ***Personal Relationships: Their Structure and Processes***. Hillsdale, NJ: Erlbaum.

Lawler, E. J., and Yoon, J. 1996. Commitment in exchange relations: Test of a theory of relational cohesion. ***American Sociological Review***, 61 (1): 89-108.

Lawrence-Lightfoot, S. 2000. ***Respect: An Exploration***. Cambridge, MA: Perseus Books.

Lu, H. P., and Wang, S. M. 2008. The role of Internet addiction in online game loyalty: An exploratory study. ***Internet Research***, 18 (5): 499-519.

Maslow, A. H. 1970. ***Motivation and Personality (2nd ed.)***. New York, NY: Harper & Row.

臺灣大學學術期刊資料庫

Nevo, S., Nevo, D., and Kim, H. 2012. Form recreational applications to workplace technologies: An empirical study of cross-context IS continuance in the case of virtual worlds. ***Journal of Information Technology***, 27 (1): 74-86.

Parks, M. R. 1995. Webs of influence in interpersonal relationships. In Berger, C. R., and Burgoon, M. E. (Eds.), ***Communication and Social Influence Processes***: 155-178. East Lansing, MI: Michigan State University Press.

Parks, M. R., and Floyd, K. 1996. Making friends in cyberspace. ***Journal of Communication***, 46 (1): 80-97.

Peterson, C., and Seligman, M. E. P. 2004. ***Character Strengths and Virtues: A Handbook and Classification***. Washington, DC: American Psychological Association.

Podsakoff, P. M., Mackenzie, S. B., Lee, J. Y., and Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. ***Journal of Applied Psychology***, 88 (5): 879-903.

Preece, J. 2000. ***Online Communities: Designing Usability, Supporting Sociability***. New York, NY: John Wiley.

Progress in International Reading Literacy Study. 2006. ***PIRLS 2006 international report***. http://pirls.bc.edu/pirls2006/intl_rpt.html. Accessed Jun. 17, 2013.

Roca, J. C., Chiu, C. M., and Martínez, F. J. 2006. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. ***International Journal of Human-Computer Studies***, 64 (8): 683-696.

Rusbult, C. E., and Buunk, B. P. 1993. Commitment processes in close relationships: An interdependence analysis. ***Journal of Social and Personal Relationships***, 10 (2): 175-204.

Snodgrass, J. G., Lacy, M. G., Dengah II, H. J. F., and Fagan, J. 2011. Enhancing one life rather than living two: Playing MMOs with offline friends. ***Computer in Human Behavior***, 27 (3): 1211-1222.

Steinkuehler, C. A., and Williams, D. 2006. Where everybody knows your (screen) name: Online games as "third places". ***Journal of Computer-Mediated Communication***, 11 (4): 885-909.

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 (4): 489-500.

Teng, C. I., and Chen, W. W. 2014. Team participation and gamer loyalty. ***Electronic Commerce Research and Applications***, 13 (1): 24-31.

臺灣大學學術期刊資料庫

Tsai, H. T., and Huang, H. C. 2007. Determinants of e-repurchase intentions: An integrative model of quadruple retention drivers. ***Information & Management***, 44 (3): 231-239.

Vatanasombut, B., Igbaria, M., Stylianou, A. C., and Rodgers, W. 2008. Information systems continuance intention of web-based applications customers: The case of online banking. ***Information & Management***, 45 (7): 419-428.

Wangenheim, F., and Bayón, T. 2004. Satisfaction, loyalty and word of mouth within the customer base of a utility provider: Differences between stayers, switchers, and referral switchers. ***Journal of Consumer Behavior***, 3 (3): 211-220.

Wu, J. H., Wang, S. C., and Tsai, H. H. 2010. Falling in love with online games: The uses and gratifications perspective. ***Computers in Human Behavior***, 26 (6): 1862-1871.

Yeh, S. Y. 2012. How oppositional loyalties resulting from producer-user collaborations reduce new product entry: Examples of online games. ***Computers in Human Behavior***, 28 (5): 1717-1727.

Zeithaml, V. A., Berry, L. L., and Parasuraman, A. 1996. The behavioral consequences of service quality. ***Journal of Marketing***, 60 (2): 31-46.

臺灣大學學術期刊資料庫

作者簡介

*** 鄧景宜**

國立臺灣大學商學博士，目前任教於長庚大學企業管理研究所。主要教授行銷學與研究方法。研究領域為網路行銷、服務業行銷。學術論文曾發表於 Journal of Service Research、Electronic Commerce Research & Applications、British Journal of Management 以及 Technovation 等科技部管理學門推薦期刊。

黃翰忠

長庚大學企業管理研究所博士候選人。主要研究領域為：網路行銷。曾獲 2014 Management Theory and Practice Conference 最佳論文獎。

陳貞菱

長庚大學工商管理學系碩士。主要研究領域為：網路行銷。

臺灣博碩學術期刊資料庫

作者感謝行政院科技部支持，計畫編號：NSC-99-2410-H-182-024-MY2。本文榮獲 2014「Management Theory and Practice Conference」Best Paper Award.

* E-mail: chingit@mail.cgu.edu.tw