

Online Gaming Adoption in Competitive Social Networks: Combining the Theory of Planned Behavior and Social Network Theory

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ABSTRACT

Online gaming has been the most rapidly growing segment of the video game market within the last ten years. Its market penetration has increased steadily attracting consumers worldwide. Even though, it occurs in a particular environment of competitive social networks, its adoption has gained only little scientific interest. To fill that gap, we suggest a model of online gaming adoption in competitive social networks. For that purpose, we combine the Theory of Planned Behavior with Social Network Theory, introducing external influences in terms of social interaction design and network exposure.

Keywords

Online Gaming, Adoption, Theory of Planned Behavior, Competitive Social Networks

INTRODUCTION

Online gaming is a technological innovation integrating broadband Internet technologies with networked gaming technologies through new web-based applications. Online gaming has heavily gained in importance to the video game industry within the last ten years due to extended IT-infrastructure, increased bandwidth, and improved user interfaces and devices (Choi, Kim 2004). However, the adoption of online gaming has attracted only little scientific interest so far (e.g., Hsu, Lu 2004).

Traditional adoption theories such as the Theory of Reasoned Action (Fishbein, Ajzen 1975) and the Theory of Planned Behavior (Ajzen 1991) can provide starting points for examining online gaming adoption. They map the cognitive processes underlying the behavior of individuals covering a wide range of objects including product and service innovations.

However, adoption theories do not account for all specificities of online gaming. For instance, online gaming is subject to strong public dispute concerning issues such as protection of minors or addictiveness and characterized by heavy interaction in various networks (Hsu, Lu 2004).

Further, online gaming occurs in a competitive setting. Different from contexts involving adoption objects intended for collaboration, gamers upon adoption compete with other gamers. Such competitive settings and their effect on adoption have, however, only been addressed by research on organization adoption (e.g., Harrison et al. 1997; Riemenschneider et al. 2003).

Network connections among competing online gamers create direct physical network externalities¹ and social pressure (Hsu, Lu 2004). Embedded in their personal networks of friends and family (adopters and non-adopters), online gamers benefit from recommendation during the adoption process.² Hence, online gaming is affected by external influences in the sense of the social systems of gamers which determine their beliefs and attitudes (Granovetter 1978). Due to the importance of external influences, online gaming adoption can barely be investigated based on traditional adoption models which mainly

¹ Direct physical network externalities denote the dependence of the utility of a behavior for an individual on the number of individuals adopting the behavior (Katz, Shapiro 1985). They have been considered in technological innovation adoption contexts, but merely been examined in terms of individuals' perceptions (e.g., Dickinger et al. 2008; Nysveen et al. 2005; Strader et al. 2007).

² For 84 % of European gamers, online chatting and meeting friends (adopters and non-adopters) is their primary leisure activity (Nielsen Interactive 2005).

disregard external influences on beliefs and attitudes (Benbasat, Barki 2007; Swanson 1994). Instead, studying online gaming adoption requires a distinct model that incorporates external influences.

To complement traditional adoption theories and to account for the specificities of online gaming, Social Network Theory with its emphasis on the influence of social networks (e.g., Barnes 1954; Burkhardt 1994; Granovetter 1978; Scott 1991) seems appropriate. A model of online gaming adoption has to integrate traditional adoption theories with Social Network Theory. In this paper, we propose such a model of online gaming adoption in competitive social networks.

ONLINE GAMING

Worldwide, online gaming has shown the highest growth rates among video games during the last decade (see Table 1). In 2005, it has attracted more than 130 million people worldwide with Asians (81.9 million) representing the largest group of players (see Table 2). With global revenue forecasts of US\$ 14.9 billion in 2008, online gaming accounts for about a third of the worldwide video game market (OECD 2005).

	US		Europe, Middle East, Africa		Asia / Pacific		Total	
	1999	2008	1999	2008	1999	2008	1999	2008
Console Games*	4,200	8,040	2,569	5,190	5,003	8,625	11,772	21,855
PC Games*	1,998	1,046	1,433	866	2,352	1,120	5,783	3,032
Online Games*	-	3,375	-	4,086	-	7,470	-	14,931
Wireless Games*	-	2,837	-	3,948	-	6,600	-	13,385

* in million US\$

Table 1. Global Video Game Revenues (Source: OECD 2005)

	US	Europe	Asia	Total
Internet Users (in Million)	94	285	350	729
Internet Users Playing Online Games (in %)	9	15	23.4	18.3

Table 2. Worldwide Online Gaming in 2005 (Source: TNS Infratest 2006)

Online gaming refers to playing traditional computer and console video games over the Internet. It draws on Java or Flash technology and refers to games played on PCs or consoles in native speed with WiFi, LAN or 3G broadband Internet access. Generally speaking, online gaming can include only an individual player, a few players, or many players (massive multiplayer use). Further, online gaming involves either hedonic or serious games.

In this paper, we only refer to hedonic massive multiplayer games. Among the best-known hedonic multi-player online games are World of Warcraft, Final Fantasy, Counterstrike and Halo.

Such online gaming connects many formerly independent personal networks of gamers in collaborative or competitive environments over the Internet. With in-game voice and instant messaging, it serves as a dating platform for gamers. Further - through games like Mankind or Perfect World - it enables gamers to dive into a virtual social context. Based on the mapping³ and modding of game titles, it offers gamers the opportunity to present themselves and gain acceptance.

³ Mapping of game titles means developing new textures and maps for existing game engines to create new games, modding of game titles means altering a game engine to create a new game.

Europe's biggest league for competitive hedonic, massive multi-player online gaming counts about 700,000 registered users in 26 European countries, China and Israel. It has a three-stage pyramid league system reaching from free ladder games or tournaments for beginners over an Amateur Series for amateurs (€ monthly fee) to a Pro Series for professionals. It comprises about 1,000 separate leagues playing 100 different game titles, thus covering the entire breadth of multi-player online gamers and games.

RESEARCH APPROACH

The adoption of new information technologies (IT) has long been studied within scientific literature. It has either been examined on individual (e.g., Pavlou, Fygenon 2006) or organizational (e.g., Swanson 1994) level. However, the basic concept underlying technology adoption models consisting of (1) individuals' reaction to the use of information technology, (2) behavioral intention and (3) behavior has been the same (Venkatesh et al. 2003). Yet, the basic concept of only referring to individuals' cognitive processes in mapping user adoption is challenged by modern information technologies such as social online networks and online gaming implications.

To tackle that challenge, we pursue a six step research approach to investigate online gaming adoption in competitive social networks (see Figure 1). Whereas steps 4 through 6 are common for empirical research approaches towards theory development (e.g., Boudreau et al. 2001), steps 1 through 3 are based on a conceptual approach mainly applied in reviews and purely theoretical work (e.g., Melville et al. 2004). In this paper, we cover the first three steps.

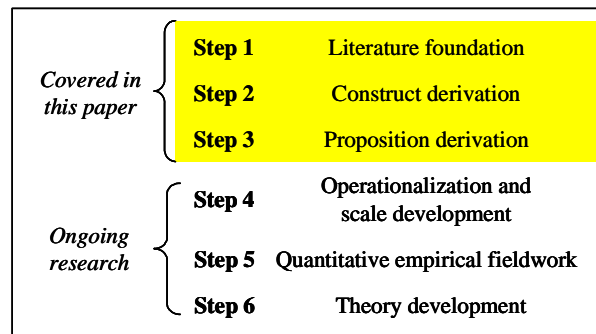


Figure 1. Research Approach to Online Gaming Adoption in Competitive Social Networks

- Step 1.** We draw on the literature to establish a conceptual foundation for explaining online gaming adoption in competitive social networks. Specifically, we turn to the traditional adoption literature and to the literature on social networks to account for online gaming specificities.
- Step 2.** Towards developing a model of online gaming adoption in competitive social networks, we derive constructs from the literature, structure them according to the Theory of Planned Behavior and extend them with constructs from Social Network Theory.
- Step 3.** To account for the relationships between the constructs embedded in the model, we derive propositions.
- Step 4.** Having established a model for online gaming adoption in competitive social networks, we enter the field to appropriately operationalize the model constructs. Together with industry experts and gamers, we develop scales that reflect the online gaming reality.
- Step 5.** To determine the factors influencing online gaming adoption in competitive social networks, we conduct quantitative empirical research in Europe's biggest online gaming league. We survey gamers along the lines of the proposed model.
- Step 6.** We contribute to theory development by extending the understanding of individual behavior to competitive social networks.

THEORETICAL FOUNDATIONS OF ONLINE GAMING ADOPTION IN COMPETITIVE SOCIAL NETWORKS

Theory of Planned Behavior

Adoption theories are based on individuals' behavioral intentions and the underlying beliefs and attitude structures (Venkatesh et al. 2003). They differ depending on object of adoption.

The *Theory of Planned Behavior* (Ajzen 1991) provides a model for decomposed belief structures adequate for examining technology innovation adoption (Taylor, Todd 1995c; Venkatesh, Brown 2001). With regard to volitional and hedonic adoption behavior as in the case of competitive multi-player online gaming, the Theory of Planned Behavior is particularly suitable and most commonly used (Venkatesh, Brown 2001). In that context, it is superior to the Technology Acceptance Model (TAM), which is mainly designed for work environments and thus emphasizes the utilitarian nature of adoption behaviors (Davis 1989; Huang et al. 2007).

The Theory of Planned Behavior, a revision of the Theory of Reasoned Action (Fishbein, Ajzen 1975), examines the drivers of an individual's behavior. It consists of seven basic constructs influencing an individual's behavior (Ajzen 1991; Taylor, Todd 1995b). Those constructs are attitudinal beliefs, normative beliefs, control beliefs, attitude, subjective norm, perceived behavioral control, and behavioral intention (see Figure 2).

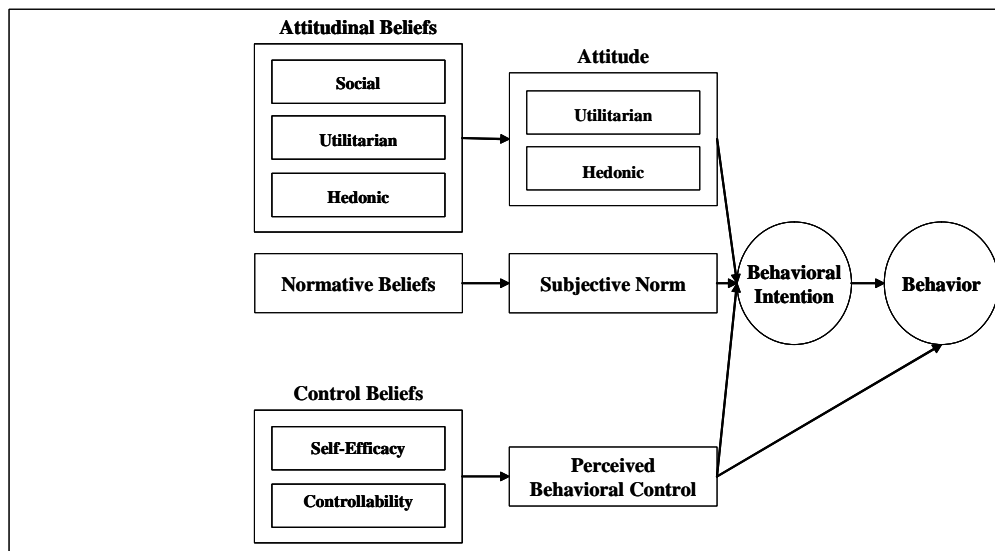


Figure 2. The Theory of Planned Behavior (Source: Taylor, Todd 1995b, 139)

As shown in Table 3, the Theory of Planned Behavior literature regarding adoption of technological innovations (behavior) points to different influences that behavioral constructs have on behavior. Whereas the effect of attitude on behavioral intention seems rather unarguable, the influences of subjective norm and perceived behavioral control on behavior and behavioral intention respectively are debatable. The influence of behavioral intention on behavior, although challenged, has widely been accepted (Bosnjak et al. 2005; d'Astous et al. 2005; Hansen et al. 2004; Hsu, Chiu 2004; Lwin, Williams 2003; Pavlou, Fygenon 2006; Shih, Fang 2004). Behavioral intention has been either used as an explained variable (Bosnjak et al. 2005; d'Astous et al. 2005; Hansen et al. 2004; Lwin, Williams 2003) or as an explaining variable to behavior (Hsu, Chiu 2004; Pavlou, Fygenon 2006; Shih, Fang 2004).

Hence adoption models that include perceived behavioral control need to explain behavior as separate construct. Those that disregard perceived behavioral control may, but do not have to explain behavior in addition to behavioral intention.

Source	Adoption Object	Core Constructs	Influence on Behavioral Intention	Influence on Behavior
Bosnjak et al. (2005)	Web-based Surveys	Attitude	positive	-
		Subjective Norm	positive	-
		Perceived Behavioral Control	positive	-
d'Astous et al. (2005)	Music Piracy	Moral Obligation	positive	-
		Past Behavior	positive	-
		Personal Consequences	indirect positive	-
		Ethical Predispositions	-	-
		Attitude	positive	-
George (2004)	Internet Purchasing	Subjective Norm	positive	-
		Perceived Behavioral Control	positive	-
		Attitude	-	positive
Hansen et al. (2004)	Internet Grocery Shopping	Subjective Norm	-	-
		Perceived Behavioral Control	-	positive
Hsu (2004)	E-Service Usage	Attitude	positive	-
		Subjective Norm	positive	-
		Perceived Behavioral Control	-	-
		Interpersonal Norm	-	-
		Social Norm	indirect positive	-
		Attitude	positive	-
		Web-Specific Self-Efficacy	positive	positive
		Perceived Controllability	-	-
		Perceived Usefulness	indirect positive	-
		Perceived Playfulness	indirect positive	-
Lwin, Williams (2003)	Online Information Fabrication	Perceived Risk	indirect positive	-
		General Internet Self-Efficacy	indirect positive	-
		Attitude	positive	-
		Subjective Norm	-	-
		Perceived Behavioral Control	positive	-
Pavlou, Fygenson (2006)	E-Commerce Adoption	Moral Obligation	negative	-
		Attitude	positive	indirect positive
		Subjective Norm	-	-
Shih, Fang (2004)	Internet Banking	Perceived Behavioral Control	positive	positive
		External Beliefs	indirect positive	-
		Attitude	positive	indirect positive
		Subjective Norms	-	-
		Perceived Behavioral Control	positive	indirect positive

Table 3. Constructs Influencing Technology Innovation Adoption in the Theory of Planned Behavior Literature

So far, Theory of Planned Behavior literature on technology innovation adoption has barely examined external influences on individuals' beliefs and attitudes (Benbasat, Barki 2007; Swanson 1994). In contrast, diffusion research has taken the dependency of beliefs upon individuals' social system for granted (Rogers 1995).

Social Network Theory

Social Network Theory (Barnes 1954; Scott 1991) focuses on the linkages between individuals rather than their attributes.

Social Network Theory ties in with the concept of social networks which are defined as "a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved" (Mitchell 1969, 2). More specifically, it addresses the influence of

social networks on behavior through the interference of individuals' beliefs and attitudes (e.g., Burkhardt 1994; Granovetter 1978).

Various theoretical models originate in Social Network Theory; most prominent are the structural equivalence model and the cohesion model. Whereas the structural equivalence model points at the importance and the development of attitudes appropriate for specific positions within a social network (Burt 1982, Burt 1987), the cohesion model highlights the influence of direct and frequent interactions on the harmonization of behaviors, attitudes and beliefs of the individual (Burkhardt 1994; Burt 1987, Festinger et al. 1950; Salancik, Pfeffer 1978). Therefore, the cohesion model seems most suitable for researching the impact of external influences on online gaming adoption.

DEVELOPING A MODEL OF ONLINE GAMING ADOPTION IN COMPETITIVE SOCIAL NETWORKS

Model Constructs

In comparison to the Theory of Planned Behavior model depicted in Figure 2, we propose an online gaming adoption model (Figure 3) in which we add three constructs. These are social interaction design (Scott 1991; v. Westarp, Wendt 2000), network exposure (Valente 1996), and social attitude (Campbell 1950). We also omit five constructs from the model depicted in Figure 2; those are normative beliefs, self-efficacy, controllability, subjective norm, and perceived behavioral control.

Following Figure 3, we develop our model along the lines of (1) external influences, (2) attitudinal beliefs and (3) attitude.

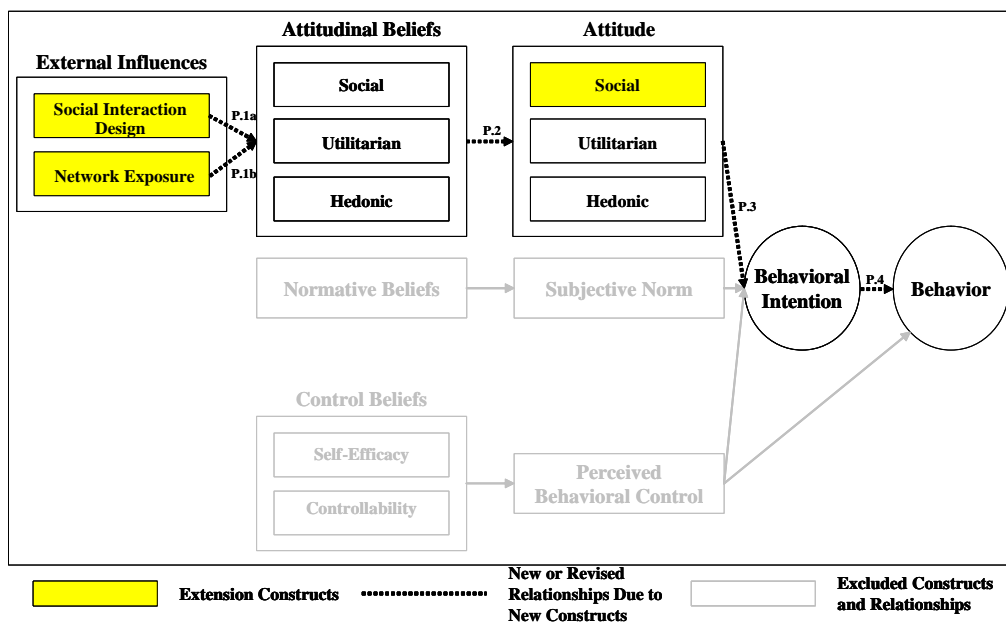


Figure 3. Proposed Model of Online Gaming Adoption in Competitive Social Networks

Constructs Remaining Unchanged

Attitudinal Beliefs unchanged. Attitudinal Beliefs are antecedents of individuals' attitudes, picturing individuals' beliefs about the social, utilitarian, and hedonic outcomes of online gaming adoption in terms of social recognition (Brown et al. 2006; Taylor, Todd 1995b; van der Heijden et al. 2005; Venkatesh, Brown 2001). We do not change or enrich this construct in comparison to the traditional Theory of Planned Behavior model depicted in Figure 2.

Behavioral Intention unchanged. As necessary variable in adoption models based on the Theory of Planned Behavior, Behavioral Intention is included also in our model.

Behavior unchanged. As our model aims to explain the behavior of adopting online gaming in competitive social networks, the construct Behavior is also included. Although we model Behavior with only one direct antecedent, Behavioral Intention, other factors outside the model scope may also influence Behavior, but remain unobserved.

Added Constructs

Social Interaction Design and Network Exposure as External Influences. External influences on individuals' beliefs and attitudes such as the direct social ties of the individual within a social system (Valente 1996; Valente 2005) are added; four external influences have been addressed by Social Network Theory as: (1) group membership, (2) network density, (3) opinion leadership and (4) network exposure (e.g., Valente 1995; v. Westarp, Wendt 2000).

Group membership (v. Westarp, Wendt 2000) is associated with social pressure and its absorption within closed user groups. It denotes individuals' self-monitoring⁴ (Burkhardt 1994). However, as online gaming is not necessarily subject to closed user groups, we disregard group membership in the proposed model.

Network density (Burt 1982; Scott 1991) denotes the number of individuals' social ties in their personal networks relative to the number of possible ties. It is relevant to online gamers as it refers to harmonizing beliefs, attitudes and behaviors within personal networks. Hence we embed *network density contributing to* the newly created construct *Social Interaction Design*.

Opinion leadership (Lee et al. 2002) denotes early adopters' influence on adoption followers' beliefs, attitudes and behaviors through social interaction (v. Westarp, Wendt 2000). It refers to the importance of social status in online gaming adoption in competitive social networks. Hence we embed *opinion leadership contributing to* the newly created construct *Social Interaction Design*.

Network exposure (Valente 1996) is defined as the share of gamers in an individuals' personal network at a given time. Measured through direct ties, network exposure covers the manifested social influence of gamers, i.e., the cognition of pressure through gamers (Venkatesh, Brown 2001). As it determines the inter-personal search by individuals for recommendations from experienced others, we use *Network Exposure as antecedent of Attitudinal Beliefs*.

In summary, we integrate two constructs in the proposed model: *Social Interaction Design* integrating network density and opinion leadership, and *Network Exposure*.

Social Attitude added to Attitude construct. Attitude, "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen 1991, 188), also needs to be a three-dimensional construct consisting of social, utilitarian, hedonic attitude (Batra, Athola 1990; Crowley et al. 1992). Hence, we add *Social Attitude* (Campbell 1950). It is influenced by individuals' beliefs such as social acceptance (Burt 1987, Festinger et al. 1950; Granovetter 1978; Salancik, Pfeffer 1978). Social attitude bridges to the literature on technology innovation adoption, as it provides empirical support for the influence of image and reciprocity on behavioral intention (Agarwal, Karahanna 2000; Taylor, Todd 1995a).

Omitted Constructs

Normative Beliefs and Subjective Norm. Network Exposure is practically equivalent to Normative Beliefs and the corresponding Subjective Norm (Ajzen 1991; Bandiera, Rasul 2006; Fishbein, Ajzen 1975; Valente 2005; Venkatesh, Brown 2005). As Network Exposure incorporates interpersonal communication beyond social pressure included by *Normative Beliefs* and *Subjective Norm*, it has a higher explanatory value than *Normative Beliefs* and *Subjective Norm*. Hence we omit the constructs Normative Beliefs and corresponding Subjective Norm from our model.

Self-Efficacy and Controllability as Control Beliefs. Control Beliefs, SelfEfficacy and Controllability reflect the perceived ease of achieving an intended behavior (Ajzen 1991). Control beliefs only indirectly affect behavioral intention (e.g. Brown et al. 2006; Taylor, Todd 1995b). Following Social Network Theory, they are replaced by direct interaction with the intended behavior (Becker 1970; Cancian 1979). Hence, we omit *Self Efficacy and Controllability as Control Beliefs* from our model.

Perceived Behavioral Control. Due to the elimination of its antecedents Control Beliefs Self-Efficacy and Controllability (Ajzen 1991), Perceived Behavioral Control is also omitted from our model.

MODEL PROPOSITIONS

We put forward five propositions concerning the suggested relationships between the model constructs.

⁴ Self-monitoring is 'the degree to which individuals are likely to adjust their behavior in response to social interaction cues' (Burkhardt 1994, 874).

Online gaming adopters search for inter-personal recommendation and thus augment the density of their personal network (Burt 1980; v. Westarp, Wendt 2000) and - in turn - density facilitates the inter-personal communication by individuals and makes contact with online gamers more likely (Valente 1996). This leads us to Proposition 1a:

Proposition 1a: Social Interaction Design positively influences the Attitudinal Beliefs of individuals towards the adoption of online gaming in competitive social networks.

The higher the exposure of individuals' personal networks to online gamers, the higher is the perceived social pressure and the inter-personal communication of individuals concerning online gaming adoption (Valente 2005). This causes strong network externalities positively influencing the social, utilitarian and hedonic beliefs of individuals concerning online gaming (Strader et al. 2007). This leads us to Proposition 1b:

Proposition 1b: Network Exposure positively influences the Attitudinal Beliefs of individuals towards the adoption of online gaming in competitive social networks.

Multiplying attitudinal beliefs with the expected consequences of a behavior determines the influence on individuals' attitudes (Davis 1989). The influence is positive in the case of a uni-dimensional construct of attitude (e.g., Taylor and Todd 1995b). This leads us to Proposition 2:

Proposition 2: Attitudinal Beliefs positively influence the attitude of individuals towards the adoption of online gaming in competitive social networks.

The more positive individuals' attitudes towards an object, the higher the behavioral intention towards adoption of that object (Bosnjak et al. 2005). This leads us to Proposition 3:

Proposition 3: Attitude positively influences Behavioral Intention to adopt online gaming in competitive social networks.

The stronger the behavioral intention of individuals is, the more are individuals inclined to show adoption behavior (Pavlou, Fygenon 2006). This leads us to Proposition 4:

Proposition 4: Behavioral Intention positively influences Behavior to adopt online gaming in competitive social networks.

RESEARCH CONTRIBUTION AND OUTLOOK

We propose a model for investigating online gaming adoption in competitive social networks. The suggested model is based on the Theory of Planned Behavior and Social Network Theory. It is determined by (1) External Influences in terms of Social Interaction Design and Network Exposure, (2) Attitudinal Beliefs, and (3) Attitude - including the newly added Social Attitude - on individuals' Behavioral Intention.

Working towards model validation and application, we operationalize the constructs and develop adequate scales in a next step. First pretests among online gamers in competitive online gaming leagues are scheduled for May 2008. They will be followed by an online survey among players in Europe's biggest online gaming league. The collected data will be analyzed using Partial Least Square (PLS) regression. Upon initial validation of the model, further tests will be conducted in other geographical regions such as South Korea and closely related, but different gaming contexts in order to gain further support towards a theory for online gaming adoption in competitive social networks.

Future research may want to look at the influence of institutional or political variables such as communication source, political environment, educational system, and legal framework on the beliefs and attitudes of individuals in order to comprehend competitive social networks in more depth.

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