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The determinants of network effects: Evidence from online games business ecosystems

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ABSTRACT

This paper explores the determinants of network effects of the two-sided online games market. We have used the Massively Multiplayer Online Role-Playing Games (MMORPG) industry as the empirical context to explore these network effect determinants. With an inductive, qualitative case study on the MMORPG ecosystem, we have developed an integrated framework combining network structural characteristics (strong tie communication and weak tie creation) and network functioning characteristics (value-informed pricing and accessory diversification), which are the key determinants of network effects. Furthermore, business ecosystem characteristics, such as internal and external resource support, will moderate and strengthen such relationships. This article not only contributes to the determinants of network effect theories, but also has implications for the practitioners in the MMORPG industry.

1. Introduction

Network effects (i.e. the positive effects that every additional user of the good or service have on the value of other users (Varian and Shapiro, 1999)), are a key phenomenon in many industries with a two-sided market structure such as search engines, video games, internet shops, online gaming such as Massively Multiplayer Online Role-Playing Games (MMORPG) and so on, where the customers' utility is based on a number of different stakeholders on the platform ecosystem (Gomes LA de et al., 2016; Rong et al., 2015) such as suppliers and customers (Ohashi, 2003; Wu et al., 2013; Zhu and Iansiti, 2012).

These network effects also hugely influence the performance of MMORPGs in such a way that enhances the customers' utility, which will then help extend the game's lifespan. However, studies on MMORPG ecosystems and the factors that determine the network effects are few and far between (Dawson et al., 2016; Liu, 2016). MMORPG is a typical example of a two-sided platform ecosystem with network effects. The MMORPG developer creates the gaming platform, as well as producing the appropriate gaming accessories, while the customers/players spend time playing the games on such platforms. The customer's utility depends on the quality of the games themselves and on there being sufficiently appealing accessories. It is noted that in order to maintain or extend the lifespan of an MMORPG ecosystem, the game developers have to attract enough players. These players will

interact frequently and gradually build up an online gaming community. These communities will then generate a 'social bandwagon' (Secchi, 2009) through which they will influence individual players to engage in the game.

Besides, there are other factors generating such network effects, for example, the regular roll-out of new gaming dungeon stories, which will attract players to work together and explore new gaming worlds. Furthermore, the diversification of gaming accessories, such as clothes and weaponries, will also have a positive impact on players' engagement with the game and the pricing of accessories based on customers' perception (i.e. value-informed pricing) also strengthens the network effects (Huotari et al., 2017; Ingenbleek et al., 2010; Wu et al., 2013). Other potential sides of the MMORPG ecosystems such as customer communities, advertisers, and events' organizers will also strengthen such network effects because their product offerings, combined with the games, enhance the overall user experience, and could potentially lead to a stronger network effect. However, extant literature has not considered how the nature of the business ecosystem influences network effects.

Hence, this paper sets out to explore the determinants of network effects as well as its moderating factors in the MMORPG ecosystem, with the following research question:

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1.1. What are the determinants of network effects in an MMORPG ecosystem?

We have conducted semi-structured interviews with the most representative games companies and players in China. We elected to conduct our research in China since the Chinese MMORPG ecosystem is one of the largest markets in the world,¹ with great potential for further growth.² By analysing the interview data, we have developed an integrated framework combining the key determinants of network effects (fairness and playability): network structural characteristics (strong tie communication and weak tie creation), and network functioning characteristics (value-informed pricing and accessory diversification). Further, we find that the business ecosystem characteristics, including internal and external resources exploited by focal firms, will strengthen such relationships. In summary, this paper sheds light on the key determinants of network effects as well as the moderating effects of the MMORPG ecosystem. The paper contributes to the literature on the determinants of network effects in terms of the network's functional and structural properties by identifying how strong and weak social ties, as well as pricing and complementor strategy, help to enhance network effects. We also extend the moderating effects of network contexts to business ecosystems that go beyond supply-side resources to include intermediary and demand-side resources.

The paper is structured as follows: the second part presents a review of the MMORPG and the relevant network effects from a theoretical perspective; the third part looks at the research methodology; we then analyse the interview data and develop the key framework and propositions. The final part discusses the contributions of this paper and highlights any aspects worthy of future research.

2. Theoretical perspective

2.1. MMORPG ecosystem and in-game accessories

An MMORPG is a game that is played on a device that can be accessed via the internet, generally through a broadband connection, and is usually played by large groups of customers in different locations simultaneously, which enables them to interact in the gaming world. To play the game, customers choose avatars (represented graphically) and equip them with virtual in-game accessories (i.e. weapons and food) which indicate different levels of skill and ability, and all of which may be carried over into subsequent gaming sessions (Wu et al., 2013). MMORPG can also be designed for casual leisure (e.g. music, sport) and educational purposes, whereby a number of customers interact with one another in a virtual world and are usually pitted against each other in a friendly, dynamic, and fun competition (Roquilly, 2011). Customers usually develop their avatars according to the options they choose within the construction of the game and communicate with the other customers playing on the same network server through instant messaging or chat features. Many MMORPG ecosystems have associated online communities, making them a form of social activity beyond single-player games (Cole and Griffiths, 2007). The interactive, group-oriented nature of MMORPG creates a sense of community among customers (based on their desire to achieve collective objectives), contributes to customer loyalty, and helps to attract new customers.

The MMORPG providers generate revenue by charging customers to play the games. Two methods are widely used to charge MMORPG customers and these depend on the context of the game (Cole and Griffiths, 2007; Roquilly, 2011). One is the *time-based* model (or subscription model), whereby customers purchase pre-paid cards to play

for a fixed number of hours or for an unlimited amount of time within a specified number of days. The other is the *item-based* model, in which the game is free to play at the basic level but the virtual in-game accessories (items) are sold to enhance the strength of the avatars and thereby generate revenue for the MMORPG operators (Castronova, 2006; Nardi and Harris, 2010). In addition to these two dominant pricing methods, a new one has emerged more recently called the *in-game advertising* model, in which revenue is generated from the embedded advertisements (Nelson et al., 2004). In this research, we focus on understanding the MMORPG providers' pricing strategy with regard to the item-based model.

Virtual in-game accessories can be viewed as a type of digital product in the ecosystem. According to the literature, the pricing strategy for digital products is different to that for consumer or industrial products, due to their unique features (Halbheer et al., 2014; Ke et al., 2012; Varian and Shapiro, 1999). Arthur (1996) indicates that consumer and industrial products that do well in a market may eventually run into difficulties, due to the increased marginal costs, declining access to raw materials, and exhaustion of consumer demand. In contrast, the cost of innovation and product development for digital products is extremely high; however, after the high initial fixed costs, the marginal costs associated with mass-production are negligible. Varian and Shapiro (1999) summarize the cost characteristics of digital products as follows: 1) costly to produce, but cheap to reproduce, 2) high sunk cost and low marginal cost, and 3) no natural capacity limits for additional copies. Thus, the pricing strategies for digital products often emphasize a dynamic pricing strategy based on product lifecycle and customized bundles (Bakos and Brynjolfsson, 1999; Ke et al., 2012; Wu et al., 2008), or a version-based pricing strategy focused on charging different prices for a range of digital products (different versions) with the same basic function, but different degrees of quality and function, to satisfy the needs of different consumers (Bhargava and Choudhary, 2008; Cheng and Tang, 2010).

Although virtual in-game accessories for MMORPG share similar product features with typical digital products (e.g. software, music), the pricing strategies for typical digital products may be inapplicable here for several reasons. First, while playing MMORPG, a customer may buy multiple copies of the identical virtual in-game accessories (e.g. virtual fabric) either for decoration (e.g. a virtual dress) or to enhance the special abilities of his/her avatar. In contrast, a customer who purchases typical digital products can benefit from the purchase of one copy of a song or video as he/she may use this copy repeatedly on different devices (Varian, 2000). Second, the MMORPG providers can maintain some degree of control over the frequency of consumption of virtual in-game accessories. For example, how many times the virtual in-game accessories are used and further distributed in the game, as well as the fact that the virtual and real currency exchange rates are controlled by the game administrator (Lehdonvirta, 2009a, 2009b). Although, in principle, the game administrator could keep everything under control, experts also point out that, due to the complexity resulting from the players' interactions, control has become more difficult than the MMORPG providers expected (Bakos, 1991; Lehdonvirta, 2005a). Nevertheless, this does not mean that the pricing strategy for typical digital products cannot be applied to the MMORPG industry at all. For example, there is a stream of literature concerned with the impact of piracy on the pricing strategy for digital products (Chen and Png, 2003). Similar studies in the MMORPG literature also suggest that piracy has had a considerable impact on the pricing strategy of the MMORPG providers (Lin and Sun, 2007; MacInnes and Hu, 2007). Taken together, while the literature recognizes such differences between typical digital products and virtual in-game accessories, research on the pricing strategy of the MMORPG providers remains currently underdeveloped.

¹ <https://www.forbes.com/sites/johngaudiosi/2012/06/06/booming-chinese-mmorpg-games-market-forecast-to-generate-6-1-billion-in-2012/#293c0ebf2e2f> (accessed March 2018)

² <https://www.forbes.com/sites/lisachanson/2014/02/26/why-mmorpgs-continue-to-be-big-money-makers-in-china/#35baeb6a1af5> (accessed March 2018)

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