Business Model, Lock-in Effect and Network Effect of Virtual Community

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Abstract. As progress of era and technology and development of internet, many firms make big change which occurring on communication and interaction among people differing from before. Especially in recent years, virtual community which has characteristics of social networking services appears and grows up, and it make the related topics of network effect more and more attraction between academics and industry. In other words, social network which has multiple functions can fully utilize the powers of these new and popular virtual community to prototype and develop rapidly on internet, even more, to make general interest users to expand human network, interact and exchange information through these internet tools. In view of this, we take Facebook, MySpace, YouTube, Flickr, Twitter, Plurk, Wretch and PTT as research subjects, through qualitative analysis, and finally we discover significant relationships among business model, lock-in effect and network effect.

1. Introduction
In recent years, the vigorous development of virtual community, both at home and abroad, has attracted many netizens' participation, and it has been highly valued by many enterprises. So, firms are willing to invest part of the company's resources to operate virtual community, and they also try to interact with netizens. After all, in virtual communities, knowledge generated through member interaction is the most important as set of virtual community and the main reason for attracting other new members to join.

However, due to the lack of research on these popular virtual community websites, both at home and abroad, and the lack of case comparison, this study is more interested in discussing the above.

In view of this, we attempt to understand the business model of these popular virtual community websites by observing and analyzing the characteristics of Facebook, MySpace, YouTube, Flickr, Twitter, Plurk, Wretch and PTT, and we try to test the effectiveness by using locking effect or network effect.

2. Literature review

2.1. Virtual community
Rheingold (1993) first proposed the concept of virtual community, which means that in the Internet space, there are a group of enough people who have long-term public discussion and information exchange, and the interpersonal network formed by full emotional communication [1]. Baym (1994) further pointed out that virtual community is generated in the following four communication processes:
(1) creating different forms of opinion expression and communication, (2) personal identity, (3) relationships among members, (4) establishing norms of behavior [2].

2.2. Business model
Hamel (2000) believed that a business model must cover the following four elements: (1) core strategy, (2) strategic resources, (3) customer interface, (4) value network [3]; in addition, he also mentioned that the four elements should be connected through three bridges, namely customer interest, activity structure and company boundary; in addition, the following four factors determine profit potential to support this business model factors of force: (1) efficiency, (2) uniqueness, (3) collocation, (4) profit propeller. As for Chesbrough & Rosenbloom (2002) said, the business model should be a middle way between technological development and economic value [4], that is, the characteristics and possibilities of technology are investment. Through the transformation of business model, it will become an economic output acceptable to customers and the market.

2.3. Lock-in effect
Liebowitz & Margolis (1994) further defined lock-in effect as that the user is unwilling or unable to switch to other new products or services due to certain factors [5]. Because the conversion cost is the main factor that causes the locking effect, different lock-in effect types usually have different conversion costs. Therefore, Shapiro & Varian (1998) proposed the following seven types of lock-in effects and explained their related conversion costs: (1) contract lock-in, (2) durable equipment, (3) personnel training, (4) information and database, (5) professional suppliers, (6) search cost, (7) loyalty program [6].

2.4. Network effect
Katz & Shapiro (1994) found that when other users choose to join the network and cause the network to expand day by day, the increase in the number of users will have a positive impact on other users, and this situation has a network effect [7]. Shankar & Bayus (2003) pointed out that the increase of network effect is mainly due to the increase in the number of users of a certain product or service. According to this, network effect can be divided into the following two types: (1) network scale; (2) network strength [8].

3. Research method
We mainly take case study method and comparative method, which will be very helpful for the verification of theory. In addition, in order to further understand the characteristics and operation mode of these virtual communities, we joined Facebook, MySpace, YouTube, Flickr, Twitter, Plurk, Wretch and PTT respectively, and we became members of these virtual community websites, so as to observe various behaviors and phenomena of their members in these virtual community websites.

4. Analysis and discussion
4.1. Business model and network effect
The research objects of this study, such as Facebook, MySpace, YouTube, Flickr, Twitter, Plurk, Wretch and PTT, are not only limited in the number of users of the website, but also unable to improve the traffic of the website when they have not yet imported the social function (see Table 1). For example, before July 2007, users of Facebook could only post text messages, but since then, it has started to open a large number of social interaction functions such as pictures, images, psychological tests and small games, and can share them with friends. Its increased sense of fun really attracted a lot of users. In addition, after May 2007, Facebook began to provide the marketplace service, which enables both parties to make transactions by publishing information and responding to the posted content. Similarly, since its opening in July 2003, MySpace has been mainly focusing on making friends and initially calling on music, but it is unable to attract a large number of users to register on
the site. However, it attracted a large number of users in early 2005 after the launch of event invitation, viral promotion of instant messaging software and alumni list. At the same time, its movie leaderboards are the features of its main social platform, and it wants to use them to differentiate itself from YouTube. Flickr, which belongs to video sharing YouTube and photo sharing, sets community operation options on its home page. Therefore, we infer that proposition 1-1 (a): when virtual community website introduces the community function in its business model customer interface, it can rapidly increase network scale; proposition 1-1 (b): when virtual community website introduces the community function in its business model customer interface, it can quickly increase network strength.

In Taiwan, Wretch adopts open platform approach. In addition to its original BBS function, which is intended to compete with PTT, it also provides an online album and even a whole set of basic blog services. Even though it later closed the BBS platform, it established the first brand blog website in Taiwan with the most users and the largest traffic. On the contrary, PTT is limited by the closed BBS architecture. Although PTT enjoys the reputation of the largest BBS station in China, it is unable to break through the limitation of this framework. Therefore, we infer proposition 1-2: in the resource allocation of its business model, virtual community website with open platform can increase network scale more quickly than virtual community website with closed platform.

According to Table 1, the number of members of relational virtual community websites such as Facebook or MySpace, far exceeds the number of members of interested virtual community websites such as YouTube, Flickr, Twitter or Plurk. As for Wretch and PTT, although they are also interest oriented virtual community websites, they are not considered because most of their users are Internet users in Taiwan and they have their own prior development restrictions. Therefore, we infer proposition 1-3: in the knowledge application of its business model, relational virtual community website can increase network scale in a shorter time than interested virtual community website.

4.2. Business model and lock-in effect
Since Facebook and MySpace are providing more dynamic information in each member's personalized page, even if the owner of the personalized page does not update the information, other viewers can still see something different each time. These dynamic information is the result of the website record extraction. In other words, the two websites themselves record all the actions of everyone on the website, and then play relevant updates on other people's pages. Of course, such a move is likely to cause privacy disputes. However, Facebook has caused protests from netizens because of this function, it has only protested for half a year, but the original protest waves have gradually disappeared. It can be seen that members have relaxed the scale of how much their own information can be disclosed. Even because these information is too funny, the traffic of the whole website has been successfully surging up. As for YouTube that shares video and audio or Flickr that shares photos, because of the strong rendering power of videos and photos, plus the community power of free sharing, as well as the unique functions of embedding and semantic tags, the cost of conversion has also been greatly increased. Therefore, we infer proposition 2-1: when the virtual community website introduces the community function into its business model customer interface, it will produce the lock-in effect of high conversion cost.

Whether it's Twitter or Plurk, it can be made into a plug-in, incarnate itself as a small frame, and then embed it in personal websites, forums or blogs at will, and update it anytime and anywhere, so this kind of intimate little action can accidentally trigger the super strong network effect of "one to ten, ten to 100". As for wretch, which is loved by Taiwanese netizens, although it competes with PTT in the first place in the service, it failed, but because it adopted the open platform strategy, skillfully combined the BBS function with the network album function, and even further integrated into the blog service later, finally let it gradually surpass and replace the PTT which always adheres to the closed architecture in the number of users and traffic of the website, or in the influence of the website. Therefore, we infer proposition 2-2: in the resource allocation of its business model, virtual community website with open platform can produce the lock-in effect with high conversion cost more quickly than virtual community website with closed platform.
According to Table 1, the number of members of relational virtual community websites such as Facebook or MySpace is far more than that of interested virtual community websites such as YouTube, Flickr, Twitter or Plurk, and it has reached such an amazing number in a relatively short time. As for Wretch and PTT, although they are relational virtual community websites, they are not considered due to their innate development or postnatal special use. Therefore, we infer proposition 2-3: in the knowledge application of its business model, relational virtual community website can produce lock-in effect of improving the conversion cost in a shorter time than interest virtual community website.

4.3. Lock in effect and network effect

Both Facebook and MySpace allow users to have their own personalized home page, and they can also place or change the information and style which they want to present at will, but they don't have to stick to the traditional standardized forms. Since then, young netizens can have a face that they can dress meticulously on the Internet, and use it to communicate and share with others. The embedding of YouTube not only enables the videos and videos shared on its website to be viewed anytime and anywhere, but also because the semantic tags provided by Flickr are deeply attractive to powerful users. Therefore, we infer proposition 3-1 (a): when virtual community website has a high conversion to native lock-in effect, it can rapidly increase the network scale; proposition 3-1 (b): when virtual community website has a high conversion to native lock-in effect; when the lock-in effect of high conversion cost is achieved, network strength can be increased rapidly.

However, although Twitter or Plurk are only micro blogs, their functions are easy to understand and easy to use, because they are designed as small plug-ins, they can achieve similar embedded functions with YouTube, so they can achieve the same powerful effect. As for Wretch, because of its open platform architecture and integration of related services and functions, it has formed the blog effect of ant hero. Even through it continue to innovate and provide updated services according to the needs of netizens, it can attract the use and love of netizens in Taiwan. On the contrary, PTT adopts a closed BBS architecture. Although it can publish and receive information in real time and attract a large number of college students, it is still limited in growth speed and expansion scale. Therefore, we infer proposition 3-2: when virtual community website has the lock-in effect of high conversion cost, open platform virtual community website can increase network scale more quickly than closed platform virtual community website.

According to Table 1, the number of members of relational virtual community websites such as Facebook or MySpace will exceed the number of members of interested virtual community websites such as YouTube, Flickr, Twitter or Plurk. In addition to the reputation effect of loyal users, it also includes Xinjia The time and energy invested by the entrant himself has transformed him into another loyal user. Under such a chain effect fermentation, the entrant can reach a certain number of members in a relatively short time, or even surpass the original competitors. As for Wretch and PTT, although they are relational virtual community websites, they are not considered due to their innate development or postnatal special use. Therefore, we infer proposition 3-3: when virtual community website has lock-in effect of high conversion cost, relational virtual community website can increase network scale in a shorter time than interest virtual community website.
Table 1. Comparison of virtual community websites.

| Website  | Founded | Number of Users | User Type | Purpose                                           |
|---------|---------|-----------------|-----------|---------------------------------------------------|
| Facebook| 2004.2  | 300 million     | from the initial group of students to all levels | building and maintaining relationships and promoting public goods or music |
| MySpace | 2003.7  | 114 million     | musicians and teenagers                         | building and maintaining relationships and promoting public goods or music |
| YouTube | 2005.2  | 100 million person times per month | general Internet users | sharing videos                  |
| Flickr  | 2004.2  | 3.3 million items | general Internet users | sharing photos                |
| Twitter | 2006.3  | 4.1 million     | heavy users                                     | share mood and information |
| Plurk   | 2007.11 | 2.73 million    | heavy users                                     | share mood and information |
| Wretch  | 1999.7  | 5 million       | mainly Taiwan netizens                          | self-expression          |
| PTT     | 1995.9  | 1.5 million     | mainly Taiwan netizens                          | instant messaging        |

5. Conclusions and suggestions

5.1. Conclusions

Based on the above discussion, this study analyzes and explores Facebook, MySpace, YouTube, Flickr, Twitter, Plurk, Wretch and PTT, and draws the following three important conclusions:

1. In the business model, if the community function is introduced into the customer interface, it will help to directly form network effect.
2. In the business model, if the community adopts open platform architecture in resource allocation, it will help to form lock-in effect and lead to network effect.
3. For business model, lock-in effect and network effect, they should adapt to each other and support each other in design and implementation, so as to play the best role.

5.2. Suggestions

First, cross industry research of related industries can be done to expand the applicability and value of this study by gradually spreading and extrapolating the research results to other fields. Second, the research propositions deduced in this study can be transformed into research variables after considering and supplementing the relevant theories to carry out quantitative research, so as to obtain more widely applicable results. Third, it is suggested that firms should try to adopt open platform architecture when they design business models, so as to have the chance to achieve the desired lock-in effect, or even strong network effect.

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