



Role of community in user innovation generation and diffusion—Focusing on non-brand communities in the mountain climbing market



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ABSTRACT

It is generally understood that manufacturers should exploit the innovation generated by users (UI: user innovation) to develop new products. UI has been observed in real world markets and the typical features of innovating users have been identified. The roles of the various communities in consumer product markets are explored as an important factor in UI. While communities foster the generation of UI and assist the diffusion of UI to the markets, it is still unclear what kind of communities managers in manufacturing firms should approach to obtain information for UI exploitation. In addition, the mechanism of UI in terms of community is also still unclear. This paper focuses on the mechanism of UI generation and diffusion in communities by applying agent-based simulation. Based on the simulation results, we are able to recommend to managers the most appropriate communities for UI exploitation.

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1. Introduction

Traditionally, firms themselves were responsible for their marketing activities. Thus, firms were to define the concepts of their products based on their worldview, develop their technologies and products themselves, and then promote them. However, today, the users of such products are now deeply embedded in the marketing process. The process of defining the concept of a product is important as it can be used to accurately capture consumers' needs (via questionnaire surveys or interviews), and its promotion is often by word of mouth. User innovation (UI) is an important phenomenon in this field.

UI refers to the process whereby users, whose product needs are not fulfilled by the manufacturers, choose to develop or improve the products themselves. UI has been observed in consumer markets, for example sailplaning (Franke and Shah, 2002), and in industrial markets, for example the modification

of OPAC systems (Morrison et al., 2000). As von Hippel (1988) pointed out, these innovations are generally conducted by a lead user (LU) and they are characterized by two properties. First, LUs have needs that will be widespread in a market, but will experience them months or years before the bulk of the market. Second, LUs are positioned to significantly benefit from obtaining a solution to those needs. Thus, UI is not something that randomly occurs and is insignificant.

von Hippel (1988) pointed out that these innovations have the potential to make firms obsolete, and firms should adopt new strategies to ensure their viability in such circumstances. This novel strategy is called the UI exploitation strategy, where information is obtained to provide solutions to consumers' needs, especially for LUs.

As shown above, UI has become popular not only in academic fields but also in business fields. However, the majority of research concerns empirical investigations in existing fields of UI or the characteristics of LU. There are few interpretative studies on the mechanism of UI. One reason for a lack of research in this area is because UI is a dynamic phenomenon, and is therefore difficult to investigate empirically. To accommodate such

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dynamics, Carliss et al. (2006) using a simulation approach, focused on modeling to explore and characterize the process by which innovations initiated by user innovators became commercial products. Furthermore, Ohori and Takahashi (2007) showed the effectiveness of the UI exploitation strategy using an agent-based social simulation (ABSS). However, despite the fact that empirical study can be used to show the importance of communities in UI, no research to date has used the simulation approach to focus on community. For example, von Hippel (2001) showed that in the software industry innovation by users in the community is more likely to occur than that by a single innovator. Furthermore, Lars and Lars (2006) showed a similar result in the sporting equipment industry, and Franke and Shah (2003) established that community members support each other by way of feedback and testing. These papers explore the effective use of UI exploitation based on market networks or community.

This paper investigates the role of communities in UI generation and diffusion, focusing on community properties. In comparison with previous studies, the principal contribution of this paper is in allowing analysis via the modeling of the community based on empirical data. UI usually derives from LUs, and LUs are setting the trends in a new era of markets, where their innovations will be diffused. These market dynamics play a crucial role in UI. To explore the market dynamics, we applied ABSS. The UI exploitation strategy, e.g., the Lead User Method, has been effective only for very restricted examples, mainly because of the uncertainty of the target markets. The approach in this paper of adopting ABSS can effectively accommodate those uncertainties and illustrate future complex situations as a bundle of possibilities.

In this study we conducted a simulation for the mountain climbing product market because it has been previously confirmed that UI exists in that market and there appears to be numerous communities. We used data collected by a questionnaire survey with climbers belonging to various communities, and then classified the communities using characteristics that can be applied to sports-related markets in general as well as to the mountain climbing market to acquire a general knowledge of the sports-related market.

We begin this paper with a literature review (Section 2), followed by an explanation of the market model (Section 3), which is based on existing research by Ohori and Takahashi (2007). In Section 4, the parameter settings are explained, including the content of the questionnaire survey conducted to acquire the data for simulation parameters. In Section 5, we show the simulation results. Next, we explain the validity of the model and discuss the managerial implications. Finally, we explain the contributions of our research.

2. Related research

2.1. Differences between the industrial product market and consumer product market

UI has been found in both the industrial and consumer product markets. In the industrial market, UI is found in various fields. Research on OPAC (the online public access catalog used by libraries) (Morrison et al., 2000) found various UI, including the design of a new sorting system for remote access for different systems. In the case of PC-CAD (Urban and von Hippel,

1988; Urban and von Hippel, 1994), users improved the software because they were dissatisfied with the upgrading of the electronic circuit. In addition, there are many other product areas where UI can be observed: petroleum processing, computer innovations, chemical processes, process equipment, scientific instruments, semiconductor and electronics subassembly manufacturing equipment, wire stripping and connector attachment equipment, and Apache OS server software (Shah, 2003).

In consumer product markets, most UI occurs in the following three fields: the IT software product market, sports-related equipment market, and motor vehicle market. Significant levels of UI also exist in the daily product market and medical product market (Lüthje, 2003). In the case of the medical product market, doctors at a German university improved a surgical instrument to make it easier to use (Lüthje, 2003). In the IT software product market there are many examples of UI, including computer-controlled music instruments (Lars and Lars, 2006), computer games (Jeppesen, 2005), and various software in the open source software development community (Shah, 2006). In this field, UI easily occurs because it does not require any special tools. Of course some development environments are required, but most of them are easily acquired or distributed by the company as a UI toolkit. In addition, there are “open source” forums, especially for conducting UI, that can be easily accessed to ask questions or identify needs. In the sports-related equipment market, UI has been confirmed in hiking equipment, mountain biking, cross-country skiing, mountain climbing (Lüthje, 2005; Lüthje et al., 2005), snowboarding, sailplaning, canyoneering, and disabled cycling equipment (Franke and Shah, 2003). UI in this market is driven by LUs with many years of experience in their chosen sport and sensitivity for new products.

When comparing the industrial and consumer product markets, it is easier to identify UI in the industrial market. This is in part because there are fewer players in the industrial product market than in consumer product market, and they have stronger networks. In addition, forums or conferences for innovation or new technology can be platforms to create networks; well-established and strong networks exist between manufacturers of industrial products and users. Thus, a UI exploitation strategy works well in the industrial product market, for example, for a medical imaging product. In contrast, it is only a brand community in the consumer product market, which is operated by manufacturers to exploit the ideas of users and fans of its product that plays a similar role in terms of forums and conferences in the consumer product market. The non-brand community in the consumer product market, which has more of a social aspect, does not play a role in sharing innovation-related information. However, it does offer a platform to create a network among users, and has been shown to have a positive effect on UI (Franke and Shah, 2002). Nevertheless, the mechanism of UI generation in the community is somewhat concealed, and thus it is important to identify and use it to reveal UI in the consumer product market.

2.2. Research focusing on community

The interest towards the role of user communities in innovation processes has grown among scholars and practitioners. The need to know more about the contribution of user communities in innovation processes stems from the increased

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