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Commercializing user innovations by vertical diversification: The user–manufacturer innovator

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ABSTRACT

This paper explores a pathway to commercializing user innovations hitherto not studied, namely, the vertical diversification of a user firm into an upstream industry supplying capital goods, and subsequent coexistence of user and manufacturing units. Such coexistence creates synergies regarding innovation, marketing, and financials. It enables the manufacturing unit to benefit from user innovations in its new product development, while the user unit profits from improved tools. Yet, selling the firm's own user innovations risks loss of the competitive advantage originating from use of these innovations. We employ case evidence from firms in the fields of foundation engineering, tunnel construction, tea-packaging, and geological surveying to derive a set of five propositions regarding the conditions under which user–manufacturer diversification is attractive and viable in the long run. These conditions relate to innovation, marketing, the organization, and financial aspects. Our study offers three contributions. We show how user entrepreneurship can originate from established corporations rather than from individual user innovators; we carve out factors that favor the move toward and the success of user–manufacturer diversification; and we link user innovation and corporate strategy by showing how user innovation can affect the boundaries of organizations.

1. Introduction

When users innovate, they intend to benefit by using their innovations (von Hippel, 1988). However, user innovations can also be valuable to other parties, and in many cases have been shown to have good commercial potential (e.g. Franke and von Hippel, 2003; von Hippel, 2005). Two ways of tapping this potential have been described. The user innovator can either pass its innovation to a manufacturer to integrate it into the latter's new product development (von Hippel et al., 1999), or can commercialize the innovation by becoming a manufacturer herself (Baldwin et al., 2006; Haefliger et al., 2010; Shah and Tripsas, 2007). In the first scenario, the user innovator maintains the functional role of a user; in the second, the user's role switches to that of a manufacturer. However, in both cases, the interaction between manufacturer and user innovator is limited, either because the user innovator remains external to the manufacturer or because the user has abandoned her functional role as a user (von Hippel, 1988).

A long-term and close relationship between the parties is conceivable if a user innovator turned manufacturer retains both roles over the long run, remaining active in the original business as a user, and also selling her user innovations on the market. We refer to this phenomenon as *user–manufacturer diversification*. The obvious benefits of this configuration are that it enables the user–manufacturer to commercialize a continuous stream of user innovations while simultaneously allowing the in-house user to benefit directly from improved commercial products. On the other hand, selling one's user innovations on the market—and to competitors in particular—risks loss of the competitive advantage that the user unit derives from the innovations. As a result, tensions can arise between the user and manufacturing units that negate the potential synergistic gains.

In this study, we explore two interrelated questions about user–manufacturer diversification: First, what are the characteristics, advantages, and drawbacks of user–manufacturer diversification, also in contrast to other pathways of commercializing user innovations? Second, which factors favor or impede the move toward and success of user–manufacturer diversification?

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We address these questions using a multiple case study approach to analyze the history, organization, and innovation management of four firms that diversified from their original business using specific equipment (the user business) into a related business manufacturing this equipment (the manufacturing business). Our focal firms are active in the fields of foundation engineering, tunnel construction, tea-packaging, and geological surveying.

Our empirical evidence shows that successful user–manufacturer diversification is possible. Based on detailed case analysis we propose that an organization's tendency to perform such a diversification, and the sustainability thereof, are determined by four groups of factors. In relation to innovation, the favorable factors are a continuous stream of innovations resulting from leading-edge activity by the user unit; in relation to marketing, a good reputation of the focal firm in its original market helps the new manufacturing unit. At an organizational level, conflicts between the user and manufacturing unit might impede the diversification and its success; in relation to finance, diversification helps to cover the investment required for user innovation and, if market cycles are asynchronous, hedges against slumps in demand for the user business. We derive five propositions regarding how these factors favor the move toward and the success of user–manufacturer diversification.

Our study contributes to the literature on user innovation in three ways. First, we show how user entrepreneurship can originate from established firms rather than from individual user innovators (as described by Baldwin et al., 2006; Haefliger et al., 2010; Shah and Tripsas, 2007). We propose a new path to user innovation commercialization, describe this phenomenon in depth, and delineate it from other paths to commercializing user innovations. Second, we reveal the factors that favor both the move toward and the success of user–manufacturer diversification. Third, we establish a new link between user innovation and corporate strategy. We show that user innovation can affect the boundaries of the firm and should thus be considered a central strategic issue (Santos and Eisenhardt, 2005; Tushman et al., 2012).

The remainder of the article is organized as follows. Section 2 reviews the relevant literature; Section 3 describes the research method, data sources, and the cases investigated. Drawing on these cases, we develop our propositions in Section 4. Section 5 compares user–manufacturer diversification to alternative pathways to commercialization of user innovation and relates our phenomenon to existing theory. Section 6 concludes and suggests implications for research and management.

2. Literature review: commercialization of user innovations

We first review the literature on how user innovations become commercial products. Known pathways are new product introduction by an existing firm in its core market and the creation of a new firm by the user innovator. Next, we review the literature pertaining to the new pathway we carve out, i.e., diversification into an upstream market based on a firm's own user innovations.

2.1. New product introduction by existing firms

We define *user need knowledge* as knowledge about the needs that current or future users of an existing or potential product experience or will experience in the future. Knowledge about user needs is valuable for firms (von Hippel, 1988), representing problem-related knowledge required for innovation (Alexander, 1964; von Hippel, 1994). Such knowledge is typically located with users external to the firm, and learning from these is important for the success of all the stages in the innovation process. In the invention and development stage, integrating knowledge from outside users contributes to the development of successful innovations (Meyers and Athaide, 1991), and innovations that incorporate user knowledge are often of greater importance than others (Chatterji and Fabrizio, 2012). In the implementation stage, existing firms can learn from users how they use early versions of the product, and obtain information about how products perform in practice (Athaide et al., 1996; Douthwaite and Park, 2001). Close interaction between manufacturers and users is positively related to the implementation of industrial process innovations (Meyers et al., 1999). The integration of users into the innovation process is especially relevant for changing or emerging technologies (Chatterji and Fabrizio, 2013; Douthwaite and Park, 2001; Meyers and Athaide, 1991).

In addition to the exchange of problem-related information with a supplier, user firms often adapt equipment to suit their needs, thereby innovating. Studies show that these firms often share their innovations with upstream equipment manufacturers (de Jong and von Hippel, 2009; Harhoff et al., 2003) and even competitors (Allen, 1983; von Hippel, 1987). In the field of scientific instruments, new devices are often developed by users and then commercialized by an external manufacturer (von Hippel, 1976). Similarly, innovations in the form of off-label uses of drugs are often freely shared (DeMonaco et al., 2006).

Innovating users may also be internal to the firm that eventually commercializes the innovation. There is a growing literature that shows that firm employees often use their firm's products (Harrison and Corley, 2011; Heiskanen et al., 2010; Leonard-Barton, 1992; Schweisfurth and Raasch, 2015; Wadell et al., 2013). These individuals acquire user knowledge by using these products outside the organization and act as boundary spanners, being able to apply this knowledge within organizational boundaries. Firms can draw on this knowledge for ideation and product testing. Research shows that knowledge about internal users' needs contributes to product innovation in the fields of outdoor sports (Heiskanen et al., 2010), medical devices (Wadell et al., 2013), and mountaineering (Harrison and Corley, 2011; Schweisfurth and Raasch, 2015). Leonard (1995) shows that internal users are involved in testing prototypes in the fields of razors and barbecue grills.

2.2. User entrepreneurship and new firm creation

To explain the innovative activities of users, von Hippel (1986) introduced the concept of *lead users*, who "anticipate relatively high benefits from obtaining a solution to their needs" and "are at the leading edge of an important market trend" (von Hippel, 2005, p. 22). Franke et al. (2006) show that the latter characteristic is associated with the commercial attractiveness of the respective user innovation. While few lead users exploit this attractiveness by becoming manufacturers, which von Hippel (1988) attributes to the difficulties of switching functional roles, some user innovators do turn into manufacturers (Baldwin et al., 2006; Haefliger et al., 2010; Shah and Tripsas, 2007). Shah and Tripsas (2007, p. 124) termed this phenomenon "user entrepreneurship", defined as "the commercialization of a new product and/or service by an individual or group of individuals who are also users of that product and/or service." It is a rather frequent phenomenon—Shah et al. (Shah et al., 2012, p. 2) find that "46.6 percent of startups founded around an innovative product or service that survive to age five are founded by users." Depending on whether the innovation originated from user needs encountered in the innovator's private or professional life, the authors distinguish between end-user and professional-user entrepreneurs.

Shah and Tripsas (2007) identify the conditions that favor end user entrepreneurship as the enjoyment the user innovator derives from the use and initial production of the respective innovation, low opportunity costs, and an industry structure characterized by small-scale niche markets. Turbulent markets also increase the