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# Technology exploitation in the context of open innovation: Finding the right 'job' for your technology

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## ABSTRACT

In light of the recent economic crisis, many industrial firms attempt to capture additional value from their technologies by means of open innovation strategies. Besides acquiring external technology, many firms therefore increasingly try to license their own technology to other firms either exclusively or in addition to its application in their own products. This article shows that technology licensing offers important strategic benefits beyond generating licensing revenues, which underscore the need for an integrated management of technology licensing activities. Therefore, this article extends the concept of job-related markets that was recently developed in the managerial literature. A 'job' is the fundamental problem that a customer needs to resolve in a particular situation. Managers may transfer this job-related understanding to technology licensing activities because the right 'job' for a technology may be outside a firm's boundaries, and it may help firms to identify additional licensing opportunities. On this basis, the article presents the concept of an integrated technology exploitation roadmap, which allows firms to use the job-related markets to integrate technology licensing in their strategic planning processes. An example of a machinery firm shows how this roadmap may contribute to strengthening a firm's licensing business.

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## 1. Introduction

"Licensing revenues make up a substantial portion of our revenues from some technologies, and an exclusive product focus is not always beneficial." This insight was gained in one of our interviews with an innovation manager of a large European machinery firm, and it summarizes the recent trend towards active technology licensing that can be observed in many industries (Cesaroni, 2003; Gambardella et al., 2007). In light of the current economic crisis, many industrial firms attempt to capture additional value from their technologies. As a consequence, many companies increasingly try to license their own technology to other firms (Fosfuri, 2006; Granstrand, 2004). While the inward transfer of technology already is commonplace with the trend towards open innovation, the outward transfer of a firm's own proprietary technology has only recently become an important dimension of corporate strategy (De Man and Duysters, 2005; Durrani et al., 1998; Kim, 2009; Murovec and Prodan, 2009; Spithoven et al., 2010; Veugelers et al., 2010). Many firms are now willing to actively license technology, but they often fail to reap

the benefits from licensing (Chesbrough, 2003; van de Vrande et al., 2009). By contrast, some pioneering companies achieve substantial benefits from outward technology transfer (Kim and Vonortas, 2006; Rivette and Kline, 2000). These successful examples underscore the opportunities that firms may achieve by integrating technology licensing into corporate strategic planning.

Under today's challenging economic conditions, successful licensing may strongly contribute to sustaining superior performance by capturing value from a firm's technologies (Arora et al., 2001; Teece, 2006). For instance, IBM and Dow Chemical generate hundreds of millions of dollars in annual licensing revenues, and Texas Instruments received about 50 percent of its net income from licensing over multiple years (Chesbrough, 2007; Rivette and Kline, 2000). Many firms are unable to fully capitalize on their technological knowledge internally, and technology licensing allows them to capture additional value from this knowledge. Procter & Gamble, for example, only uses about 10 percent of its technologies in its own products, and this provides great opportunities for technology licensing (Huston and Sakkab, 2006). In a similar vein, Motorola estimates that the external exploitation of its cell-phone technologies could add as much as \$10 billion to its annual revenues (Lichtenthaler, 2007). In addition, firms may realize various strategic benefits, which have an indirect effect on monetary performance (Arora et al., 2001).

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Besides these positive effects, technology licensing involves substantial risks. In particular, it may lead to strengthening competitors because of diffusing competitively relevant know-how (Rivette and Kline, 2000). This 'rent dissipation effect' (Fosfuri, 2006) constitutes the main reason for employees' negative attitudes to technology licensing that prevail in many firms. These negative attitudes may be explained by the underlying fear of transferring 'corporate crown jewels' (Kline, 2003). Along with the great opportunities, the major risks of licensing technology underline the importance of integrated technology exploitation strategies, which consider interdependencies between internal technology application in a firm's own products and outward technology transfer by means of licensing (Fosfuri, 2006; Teece, 1998).

However, prior research has relatively neglected technology licensing in strategic planning despite its increasing managerial importance. Prior licensing research is mainly limited to managerial works (e.g., Rivette and Kline, 2000) or to the analysis of particular motives for technology licensing, especially foreign market entry (e.g., Contractor, 1984). Consequently, technology exploitation in open innovation processes has received insufficient attention. Despite the major impact of research into open innovation (Chesbrough, 2006; West et al., 2006), our understanding of technology exploitation in this context is limited. This research deficit is underlined by the managerial difficulties of many companies which contrast with the enormous success of some pioneering firms in actively licensing technology (Escher, 2003; Lichtenthaler, 2007). The examples of these pioneering firms indicate that a firm's strategic planning activities play a critical role in developing a successful technology licensing program (Chesbrough, 2007). In addition, prior research has shown that most firms which actively commercialize technology are also deeply involved in acquiring external technology (Lowe and Taylor, 1998). One major reason for this finding may be the strategic technology planning of these firms in open innovation processes (Chesbrough, 2003; Grant and Baden-Fuller, 2004).

Therefore, this paper examines an important field of strategic technology planning in the context of open innovation, i.e., the strategic planning of technology licensing activities. This issue has recently been highlighted as an area ripe for further study (Gassmann, 2006; Lichtenthaler and Ernst, 2009; West et al., 2006). The remainder of this article is structured as follows. In Section 2, the benefits from technology licensing are briefly addressed. In Section 3, the paper presents a so-called job-related understanding of markets, which may help to identify additional application opportunities for a firm's technology. In Section 4, the implications of this job-related market view in the context of open innovation processes are discussed. In Section 5, the paper presents the concept of product-technology roadmaps (Kostoff and Schaller, 2001), which may help to develop effective technology planning processes. In Section 6, we present a conceptual approach to extend roadmapping instruments in response to opening innovation processes. This extended roadmap was developed in a case study of the strategic technology planning processes of a machinery company. In Section 7, the article's theoretical and managerial implications are discussed, and directions for future research are presented.

## 2. Benefits from technology licensing

Technology licensing constitutes the external mode of technology exploitation in addition to internal technology application in a firm's own products (Hill, 1992; March, 1991). In most out-licensing transactions, firms attempt to achieve a combination of several benefits rather than focusing on one specific objective

(Lichtenthaler, 2007; Motohashi, 2008). In particular, technology licensing provides monetary and strategic benefits (Bidault, 2004; Kollmer and Dowling, 2004). The monetary benefits refer to generating licensing revenues. At least equally important, however, seem to be the strategic benefits from technology licensing. In this case, a firm does not attempt to directly generate licensing revenues. Instead, the firm tries to improve its competitive position, which indirectly affects its financial performance (Grindley and Teece, 1997; Ziedonis, 2007). The strategic benefits fall into two categories: licensing to strengthen a firm's product market position and licensing to enhance a firm's technological position (Lichtenthaler, 2007; Nagaoka and Kwon, 2006).

A major product-related motive for technology licensing is entry into national and foreign markets. In the past, many firms have focused on entry into foreign product markets. Here, licensing constitutes a substitute for foreign direct investments, which would result in internally applying technologies in a firm's own products (Adam et al., 1988; Mirus, 1980). Another product-related motive for technology licensing is selling products in addition to transferring technology. These indirect advantages may be the primary motive for a licensing transaction, where technology is used to gain access to new product markets (Bidault, 2004; Teece, 1998). In other cases, a firm may have to actively find external adopters of its technology because only by this adoption will its product business be successful. In particular, companies may need to set an industry standard, which may be achieved by licensing technology to multiple firms (Ehrhardt, 2004; Sahay and Riley, 2003).

By contrast, the technology-related strategic benefits from technology licensing are directed at strengthening a firm's technological position. Firms may cross-license their technologies with other organizations to avoid potential patent infringement lawsuits, which would prevent them from further developing their technologies and commercializing their products (Grindley and Teece, 1997; Nagaoka and Kwon, 2006). Moreover, technology out-licensing transactions may be primarily directed at the acquisition of external technology, which is realized in bi-directional technology transfers based on cross-licensing agreements (Lichtenthaler, 2007; Nagaoka and Kwon, 2006). The acquisition of external technology is a requirement rather than an option for many firms, and outward technology transfer may be the only way to get access to external technologies in return. Thus, technology out-licensing may be essential to complement a firm's internal technology portfolio (Grindley and Teece, 1997; Silverman, 1999).

Accordingly, technology licensing may provide monetary and several strategic benefits. In particular, the product-related and technology-related strategic motives underscore the interdependencies between technology licensing and product marketing. These interdependencies point to the complementary character of the two modes of technology exploitation, and they call for an integrated management of technology licensing activities (Brockhoff et al., 1999; Kotabe et al., 1996). Specifically, several recent trends have led to an increasing importance of integrating technology licensing in corporate strategy. For instance, the growing convergence of multiple technology fields along with increasing R&D expenditures in many industries motivate firms to identify additional ways to achieve a sufficient return on their R&D investments (Chesbrough, 2003; Kodama, 1992). Consequently, many firms attempt to achieve monetary and strategic benefits from actively licensing technology (Kim, 2009).

Beyond these benefits, however, technology licensing involves substantial risks. In particular, it may result in strengthening competitors because of diffusing competitively relevant know-how (Arora et al., 2001; Fosfuri, 2006). Along with the great benefits, the major risks of technology licensing underline the

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