



Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Research Policy

journal homepage: www.elsevier.com/locate/respol



Complementarities in the search for innovation—Managing markets and relationships

Christoph Grimpe^{a,c,*}, Wolfgang Sofka^b

^a Copenhagen Business School, Department of Innovation and Organizational Economics, Kilevej 14A, 2000 Frederiksberg, Denmark

^b Copenhagen Business School, Department of Strategic Management and Globalization, Kilevej 14A, 2000 Frederiksberg, Denmark

^c ZEW Centre for European Economic Research, Department of Economics of Innovation and Industrial Dynamics, L7.1, 68161 Mannheim, Germany

ARTICLE INFO

Article history:

Received 16 February 2016

Received in revised form 19 July 2016

Accepted 21 July 2016

Available online xxx

Keywords:

Search strategies

Collaboration

Markets for technology

Innovation performance

ABSTRACT

Extant research has characterized a firm's search for external knowledge in its innovation activities as either relational or transactional in nature. The former implies that a firm chooses and develops collaborative relationships with knowledge sources like universities, customers or suppliers, while the latter suggests transactions governed by markets for technology. We argue that prior literature has ignored that both search strategies are interrelated and complementary: adopting one strategy has a higher marginal return on innovation performance if the other one is present. Moreover, we suggest the benefits from complementarity to be higher when a firm is more distant to the technological frontier in the industry and when markets for technology in that industry are shallow. We test our hypotheses on a sample of 3921 German firms from 2001 to 2009 and find support for our hypotheses.

© 2016 Elsevier B.V. All rights reserved.

1. Introduction

The question of how firms organize their search for new knowledge and turn it into innovative products is central to both research in strategic management and innovation policy making (e.g., Katila and Ahuja, 2002; Laursen and Salter, 2006; Edler and Polt, 2008). Many firms incorporate knowledge from external sources such as universities to enhance their innovation performance. The performance effects stem from new products based on novel combinations of internal and external knowledge (Rosenkopf and Nerkar, 2001) or more efficient R&D processes (Fleming and Sorenson, 2004). However, our current theoretical understanding of how firms should organize their search for external knowledge is fragmented. One stream of research envisions knowledge search as *relational* in nature. Connecting with external partners “requires extensive effort and time to build up an understanding of the norms, habits, and routines of different external knowledge channels” (Laursen and Salter, 2006: 135). In other words, the use of external knowledge requires the presence of idiosyncratic linkages if the firm is to reap relational rents (Dyer and Singh, 1998; Dyer and Hatch, 2006). A second prominent, but largely unconnected stream of literature characterizes the search for knowledge

as *transactional*.¹ Search occurs in *markets for technology* on which disembodied knowledge is traded at a certain price (Arora, Fosfuri, and Gambardella, 2001; Arora and Gambardella, 2010; Arora and Nandkumar, 2012; Agrawal et al., 2015).

We observe many firms to adopt both relational and transactional search strategies at the same time: they may collaborate intensively with university scientists in a joint research project while licensing in technology from a specialized supplier. While following any of those strategies increases the openness of a firm to external knowledge in its innovation process, the open innovation literature (Chesbrough, 2003) has yet to provide a consistent explanation for how these strategies are related to one another. Relational search provides firms with unique knowledge that will be difficult for competitors to imitate. Transactional search and adopting more generic solutions, though, dilutes such uniqueness and threatens a firm's ability to appropriate value in downstream product markets. Hence, the goal of our article is to explain why firms engage in both relational and transactional knowledge search

¹ Other studies use the term “markets for ideas” (Gans and Stern, 2003, 2010; Agrawal et al., 2015) for the market-based exchange of knowledge. However, we find no theoretical discrepancy between that term and the term “markets for technology” within the framework of our study, and we believe that the latter reflects a closer link with recent strategic management literature (Arora and Nandkumar, 2012). Notably, this conceptualization is limited to the exchange of technological knowledge—it does not include the buying and selling of high-tech equipment, which would be governed by product markets (Conti et al., 2013).

* Corresponding author.

E-mail addresses: cg.ino@cbs.dk (C. Grimpe), ws.smg@cbs.dk (W. Sofka).

simultaneously. For this purpose we provide a theoretical logic and empirical test for why (a) relational and transactional knowledge search do not follow identical, interchangeable mechanisms in how they increase innovation performance and (b) that these effects on performance are not independent from one another. Put differently, we provide a rationale for why firms should engage in costly collaborations with selective partners even when knowledge can be acquired efficiently from markets for technology. Hence, we theorize on interrelated and complementary performance effects from relational and transactional search, i.e. adopting one search strategy has a higher marginal return on innovation performance when the other one is present as well.

We demonstrate the usefulness of our complementarity reasoning by exploring two contingency arguments, highlighting conditions under which complementarity is more likely to emerge: a firm's distance to the technological frontier in its industry and the thickness of the market for technology. First, the closer a firm is to the technological frontier, the more unlikely it becomes that the firm can benefit from markets for technology because existing knowledge is unlikely to support frontier research. Instead, relational search offers potentials to co-create novel knowledge which can extend the technological frontier. Hence, we predict that the benefits from complementarity are likely to be higher if firms are increasingly distant from the technological frontier. Second, as market thickness, defined as the presence of enough potential buyers and suppliers to allow the market to match them efficiently (Roth, 2007; Gans and Stern, 2010), in an industry increases, the cost advantages and the flexibility associated with market transactions outweigh the advantages of relational search. Put differently, if large parts of the knowledge production in an industry are accessible through markets, building up costly relationships would become increasingly inefficient. Therefore, we predict that the benefits from complementarity are higher if markets for technology are shallow.

Overall, we make four contributions to the extant research. First, we eliminate a source of bias found in studies that investigate relational search while neglecting interactions with markets for technology (e.g., Laursen and Salter, 2006; Leiponen and Helfat, 2010). Our findings allow us to distinguish between general industry effects, such as technological opportunity or IPR regimes, and the influence of the market for technology. In so doing, we more clearly define a route for developing new theory on the complementarity between different channels of external knowledge acquisition. Moreover, we introduce a new direction in the theory on markets for technology. Several studies highlight the fact that markets for technology are underdeveloped or inefficient (Gans et al., 2008; Gans and Stern, 2010). However, mitigating mechanisms at the firm level have thus far been absent from theoretical development. We show that relational and market mechanisms are not isolated, and that adopting both relational and transactional search is especially valuable when markets for technology are underdeveloped. This highlights a promising avenue for future studies on markets for technology, which allow firms to adjust firm-level strategies to counterbalance weaknesses in market institutions.

Second, by focusing on the conditions for complementarity, our research clarifies a central tenet in resource- and knowledge-based theories, which maintain that firm-specific knowledge that results from relational search generally has the greatest potential to create competitive advantage (Kogut and Zander, 1992; Grant, 1996; Wang et al., 2009). The firm-specificity of knowledge has been argued to complicate imitation by competitors and, thus, to slow diffusion, which in turn allows the firm to appropriate returns from innovation in downstream product markets (Helfat, 1994). However, firm-specificity in itself may be of little value if thick markets for technology facilitate competitors' access to substitute knowl-

edge. As a consequence, firm-specificity becomes less effective as an isolating mechanism. We therefore need more nuanced theorizing on how firm-specific knowledge translates into competitive advantage (Wang et al., 2009).

Third, we contribute empirically by introducing a novel measure that captures the thickness of the market for technology in monetary terms that are comparable across industries. Based on data from the German part of the European Community Innovation Survey (CIS), which includes 3921 firm-year observations made from 2001 to 2009, we calculate and project aggregate firm expenditures on markets for technology in 20 different industries over time. The data provide us with a unique opportunity to capture the market for technology—at least for firms based in Germany—and thereby complement prior efforts in the literature that have focused on measures such as the supply of university patents (e.g., Arora and Nandkumar, 2012), or were limited to industries with high patent propensity (e.g., Gambardella et al., 2007). In this regard, our ability to provide aggregate expenditure figures remedies the general shortage of data on licensing and external R&D contracting and may trigger future research on a variety of related topics (Agrawal et al., 2015). What is more, our empirical design allows us to disentangle what a firm has acquired from markets for technology (transactional search) from what was available on the market. Our measurement is informed by a series of semi-structured interviews with innovation executives managing the organization of external knowledge acquisition. These conversations also helped us gain a better understanding of how relational and transactional search interact and when engaging in both is particularly (or less) beneficial.

Fourth, our findings have direct implications for management practice as well as policy making. We provide more precise insights into how firms can benefit from open-innovation trends which go beyond generic recommendations on how firms should organize the search for external knowledge (Huston and Sakkab, 2006). At the same time, our findings can inform policy making. Several factors underlying the efficiency and coverage of markets for technology are subject to rules and regulations set by governments, such as regulations on IPR. Our findings indicate that changes in these rules have repercussions for firms that have developed relational search strategies. A comprehensive impact analysis of policy changes must include consideration of the fact that such firms will lose competitive advantage originating from specific knowledge ties if markets for technology are made more efficient.

2. Theory and hypotheses

In the following, we review the mechanisms underlying the relationship between relational and transactional knowledge search and innovation performance. We adopt a strategy definition of innovation performance as the economic returns of a firm from its innovations (e.g., Laursen and Salter, 2006; Nerkar and Shane, 2007). While prior literature has already established a positive association of both types of search in isolation with innovation performance (e.g., Laursen and Salter, 2006; Arora and Gambardella, 2010), theoretical predictions on the complementarity of relational and transactional search are novel to our model.

A precise definition of complementarity is crucial for our theoretical and empirical model. We follow Milgrom and Roberts (1990) and identify complementarity based on marginal performance effects of one activity when the other is present. Within our setting, relational and transactional search are complementary when the marginal return from engaging in relational search increases with engagement in transactional search and vice-versa. This approach has a long tradition in research on complementarity of knowledge-based strategies, for example on the complementarity of internal

Download English Version:

<https://daneshyari.com/en/article/5104053>

Download Persian Version:

<https://daneshyari.com/article/5104053>

[Daneshyari.com](https://daneshyari.com)