



Tensions in R&D networks: Implications for knowledge search and integration



Paavo Ritala ^{a,*}, Eelko Huizingh ^b, Argyro Almpantopoulou ^a, Paul Wijbenga ^b

^a Lappeenranta University of Technology, School of Business and Management, P.O. Box 20, FI-53851 Lappeenranta, Finland

^b University of Groningen, Faculty of Economics and Business, Department of Innovation Management & Strategy, P.O. Box 800, 9700 AV Groningen, The Netherlands

ARTICLE INFO

Article history:

Received 1 July 2016

Received in revised form 21 November 2016

Accepted 30 December 2016

Available online 20 January 2017

Keywords:

R&D network

Innovation

Tension

Paradox

Knowledge search

Knowledge integration

ABSTRACT

R&D Networks comprise different actors with various goals and motivations. Thus, such networks are filled with tensions that emerge from simultaneously existing, competing or contradictory organizing elements and demands. In this study, we examine the knowledge search and integration behaviour of firms participating in R&D networks in the Dutch aerospace sector. We find evidence of a multitude of tensions that have implications for knowledge processes of firms and within R&D networks. These tensions are grouped into dialectical and paradoxical tensions. In particular, paradoxical tensions require simultaneous attention to the different organizing elements, while dialectical tensions create either/or situations that need to be carefully managed. We find two types of dialectical tensions: openness of core knowledge exposure and inclusiveness of knowledge sharing behaviour; and three types of paradoxical tensions related to innovation goal alignment, competition, and actor interdependence. Overall, our results provide unique insights to how participants of R&D networks perceive tensions involved in knowledge search and integration, how the network role of the actors affects these perceptions, and what types of tension-resolving mechanisms are adopted in different types of networks.

© 2017 Elsevier Inc. All rights reserved.

1. Introduction

Search and integration of valuable knowledge are key processes that motivate firms to participate in multi-actor R&D networks (Cowan and Jonard, 2009; Powell et al., 1996). Through the multi-actor knowledge processes, such networks provide opportunities for collective innovation efforts which would be unattainable without collaboration (Dhanaraj and Parkhe, 2006; Fjeldstad et al., 2012). However, R&D networks are far from being stable and easy-to-manage. Such networks are dynamic loosely coupled coalitions, that involve issues such as cooperation (see e.g. Yami and Neme, 2014), rotating leadership (Davis and Eisenhardt, 2011), appropriation challenges and knowledge leakage (Dhanaraj and Parkhe, 2006; Ritala et al., 2015), and other elements of relational and contractual complexity. To better understand these issues, this paper explores the tensions that emerge from R&D networks, and the outcomes of those tensions to knowledge search and integration processes. Much of the previous research on R&D networks adopts a rather structural perspective (see e.g. Ghosh and Rosenkopf, 2014), and pays less attention to the tensions that affect the internal dynamics of those networks. As the success of R&D and innovation activities is grounded on effective knowledge search and integration (see e.g. Savino et al., in press), we argue that it is important to

understand the role of tensions that affect these delicate inter-organizational knowledge processes.

To bridge the above-mentioned research gap, this paper studies the tensions of actors that join and participate an R&D network. While the literature over organizational (Birkinshaw et al., 2016; Gaim and Wählin, 2016) as well as inter-organizational tensions (Gnyawali et al., 2016; Tidström, 2014; van Fenema and Loebbecke, 2014) has started to accumulate, very little has been done yet in this area regarding the different types of tensions in R&D network context. Given the complex and uncertain nature of collaborative innovation (Dhanaraj and Parkhe, 2006), we argue that understanding the influence of tensions on the processes and outcomes of R&D networks could generate promising insights for both managers and academics in the field of R&D and innovation management. Foss et al. (2013) found that organizational design matters for external knowledge search in terms of innovation outcomes. Similarly, we expect that the organizational design in R&D networks – and especially the tensions emerging from such designs and configurations – affect actors' ability and willingness to search and integrate knowledge. Indeed, several authors have advocated the importance of how R&D networks are designed and organized (Dhanaraj and Parkhe, 2006; Fjeldstad et al., 2012), and recently called for more studies on the role of tensions and the related resolution mechanisms in inter-organizational networks and relationships (Gnyawali et al., 2016; van Fenema and Loebbecke, 2014). In the current study, our approach is qualitative and explorative in that we outline the general sources of tensions in R&D networks, after which we inductively identify the key tensions from the qualitative study in the Dutch Aerospace

* Corresponding author.

E-mail addresses: ritala@lut.fi (P. Ritala), K.R.E.Huizingh@rug.nl (E. Huizingh), argyro.almpantopoulou@lut.fi (A. Almpantopoulou), p.v.wijbenga@gmail.com (P. Wijbenga).

sector. We particularly focus on knowledge-related tensions, given that the valuable resources exchanged and created have argued to rely on mostly knowledge within and between actors and networks (e.g. Baum et al., 2010; Schilling and Phelps, 2007).

Our research question is: What kind of tensions exist in knowledge search and integration processes in R&D networks and which mechanisms are applied to resolve these tensions? By focusing on tensions and their resolution mechanisms, rather than the general management or coordination of the networks as such, we analytically depart from the larger body of literature focused around managing or orchestrating R&D and innovation networks (e.g. Dhanaraj and Parkhe, 2006; Nambisan and Sawhney, 2011; Paquin and Howard-Grenville, 2013). We do this for three main reasons. First, almost each network contains more participating firms than orchestrating firms, so it is important to understand their perception of the networks rather than focusing on hub-firm coordination activities only. Second, many smaller firms have not much influence in deciding which other firms will be the network members, as they can only decide whether they will join the network or not, and in this assessment they will perceive and evaluate the inherent tensions. Third, tensions and related resolution mechanisms are often perceptual and local to the firm, and therefore studying them using our approach will provide important evidence of knowledge behavior of actors in R&D networks. Thus, in this study we develop an approach that analyzes the tensions perceived by the focal actor in R&D networks, and how this affects the relevant knowledge processes. We also examine how the network roles of the firms as well as the characteristics of the networks affect the perceived tensions and the related tensions-resolution mechanisms.

The remainder of this paper is structured as follows. First, we discuss the key concepts and the theoretical background of the study. Second, we discuss the qualitative case study methodology used to analyze tensions in Dutch Aerospace R&D networks. Third, we analyze in detail the findings related to different types of tensions and their role in knowledge search and integration processes. The study ends with discussion and implications. The findings provide evidence of a broad diversity of tensions in R&D networks, and show how the network role (central or peripheral) of the firm affects these perceptions. We also find patterns of different tensions related to networks having different characteristics in the knowledge proximity between actors. These findings contribute to the literature of R&D networks in providing an elaborated view of perceived dialectical and paradoxical tensions, as well as the related dynamics and contingencies.

2. Theoretical background

2.1. R&D networks

The term *R&D network* refers to a group of contractually and relationally interconnected organizations with a common mission and purpose that seeks to gain innovation benefits that could not be achieved independently (see e.g. Arranz and de Arroyabe, 2007). The participants include various types of private and public organizations that seek to share risks and achieve common R&D goals by pooling resources and integrating knowledge (e.g. Biggiero and Angelini, 2015; Lee and Kim, 2016-in press). R&D networks – as a context – belong to the broader literature on collaborative innovation (e.g. Fjeldstad et al., 2012), innovation networks (Dhanaraj and Parkhe, 2006) and interfirm networks (Ghosh and Rosenkopf, 2014). R&D networks focus on the early phases of the collaborative innovation, where knowledge is searched and integrated in order to create new, valuable combinations that have potential to create new products, processes, and services (see e.g. Aarikka-Stenroos and Sandberg, 2012).

In this study, we focus on the focal firm's *participation* in and *perception* of R&D networks. In our analysis, the focal firm is not always orchestrating or assembling the network (on orchestration, see Dhanaraj and Parkhe, 2006), but participates in the network and reflects on its own

role and perceived tensions as a part of the network. Many firms have no or only very limited influence on which other firms are in the network. Innovation and R&D network research has typically overlooked such “peripheral firms” and their decisions (Ritala and Huizingh, 2014), and thus we believe that the adopted broad-based perspective is valuable. In fact, when thinking about a typical hub-and-spoke network structure, the peripheral firms are the large majority, and have to adopt to the possibilities and limitations offered by the larger network fabric consisting of different actors and their roles.

2.2. Knowledge search and integration in R&D networks

Innovation processes consist of actors searching for knowledge, and of combination and integration processes of that knowledge (for a recent review, see Savino et al., in press). Martini et al. (in press) found that external search is ineffective when the firms are not able to share the knowledge internally. The same issue has been noted in the inter-organizational context. Knowledge integration across organizational boundaries is necessary in order to create novel knowledge combinations and eventually new innovations (Cowan and Jonard, 2009; Powell et al., 1996). In our study, we utilize these insights in the R&D network level in suggesting that knowledge sharing between the actors in the network is a complex and volatile process, which deserves more attention.

One stream of research concentrates on *knowledge search* and related strategies, processes and outcomes. For instance, several studies have highlighted the importance of external idea involvement in R&D processes (e.g. Henttonen et al., 2011; Laursen and Salter, 2006; Tether, 2002). This literature has shown that external ideas to firms' R&D processes create value and novelty due to the complementary knowledge and ideas that can be integrated in a firm's internal R&D, and facilitate subsequent development of innovations. Literature on open innovation (and especially inbound open innovation) provides extensive discussions of how such mechanisms work (see e.g. West and Bogers, 2014). It is noteworthy to mention that knowledge search behavior is a two-way, reciprocal phenomenon (Ritala et al., 2015; Tranekjer and Knudsen, 2012). This means that firms participating in R&D networks cannot easily assume an asymmetric search mode where they would receive valuable knowledge, but not allowing for other actors to search knowledge from their own domains. On the other hand, asymmetries in the search behavior could be a source of tension between the network actors.

Another stream of relevant literature focuses on the processes of *knowledge integration* between firms in R&D and innovation networks. Integration of complementary and supplementary knowledge as such is a key motivation to form inter-organizational relationships (Grant and Baden-Fuller, 2004), and especially in R&D collaboration (Cowan and Jonard, 2009; Powell et al., 1996). The existing research concentrates, for instance, on how knowledge sharing and integration is facilitated and orchestrated (Dhanaraj and Parkhe, 2006; Nambisan and Sawhney, 2011). Many studies also argue that knowledge integration in networks is a delicate process, which is full of frictions, tensions, and contradictions (Alexy et al., 2013; Ghosh and Rosenkopf, 2014). In the remainder of this study, we will use the terms knowledge sharing and integration as synonyms.

We expect that firms participate in R&D networks for both reasons: to search for valuable external knowledge, and to share and integrate knowledge with other network actors. We also argue that these processes strongly depend on the key organizing elements of R&D network, and the related tensions. The following section discusses these issues.

2.3. Tensions in the organizing of R&D networks

The literature on R&D and innovation networks has discussed the coordination (e.g. Dhanaraj and Parkhe, 2006; Gardet and Fraihua, 2012; Nambisan and Sawhney, 2011), the structure and the dynamics

Download English Version:

<https://daneshyari.com/en/article/5036790>

Download Persian Version:

<https://daneshyari.com/article/5036790>

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