



How to manage innovation processes in extensive networks: A longitudinal study

Leena Aarikka-Stenroos^{a,*}, Elina Jaakkola^b, Debbie Harrison^c, Tiina Mäkitalo-Keinonen^d

^a Laboratory of Industrial and Information Management, CITER (Center for Innovation and Technology Research), Tampere University of Technology, Korkeakoulunkatu 10, FI 33720, Tampere, Finland.

^b Department of Marketing and International Business, Turku School of Economics, University of Turku, 20014, Finland

^c Department of Strategy and Entrepreneurship, BI Norwegian Business School, Nydalsveien 37 0484, Oslo, Norway

^d Turku School of Economics, Pori Unit, Pohjoisranta 11 A, 28101 Pori, Finland

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ABSTRACT

In this paper, we examine the managing of the full innovation process, from visioning to commercialization, in extensive networks. By drawing on the IMP, strategic network, and innovation network literatures, we develop a comprehensive picture of the management activities when ‘mobilizing’, ‘orchestrating’, and ‘involving’ actors in working towards the innovation aim in such network settings. Through using two longitudinal case studies – the one pursuing radical and the other incremental innovation – we provide an empirically refined understanding of seven key management activities (motivating, resourcing, goal setting/refining, consolidating, coordinating, controlling, and leveraging), which are needed throughout the innovation process to turn the diversity of an innovation network into an opportunity rather than an obstacle. We demonstrate how actor diversity and the type of innovation (radical or incremental) shape the management activities, and map a dynamic actor composition that evolves alongside the innovation process. The longitudinal data highlights the consequences of the presence or lack of management activities, and the interlinkages between activities throughout the process. Our findings also provide insights for practitioners on how to cope with the increasing tendency to involve diverse stakeholders in innovation by pinpointing the critical management activities that can be employed.

1. Introduction

Innovation in contemporary markets increasingly requires co-operation within extensive networks, as many technological innovations tend to require multi-sectoral collaboration (Biemans, 1991; Håkansson & Waluszewski, 2007; Powell, Koput, & Smith-Doerr, 1996; Rampersad, Quester, & Troshani, 2010), or involve public and private actors with inherently different views (e.g., Nissen, Evald, & Clarke, 2014; Reypens, Lievens, & Blazevic, 2016; Öberg & Shih, 2014). Researchers have acknowledged that involvement of diverse stakeholders in innovating is essential, but also note that it complicates interaction. On the one hand, an increased diversity of actors expands the breath of resources available, which is relevant for the full process of innovation from development to commercialization (Aarikka-Stenroos & Sandberg, 2012; Baraldi & Strömsten, 2009) and facilitates innovation success through learning and creativity (Corsaro, Ramos, Henneberg, & Naudé, 2012; Driessen & Hillebrand, 2013; Reypens et al., 2016). On the other hand, actor diversity brings about heterogeneity in knowledge, logics,

competences, and power (Corsaro, Cantù, & Tunisini, 2012; Öberg & Shih, 2014), and therefore tends to complicate innovating by increasing a mismatch across actors' goals, vocabularies and technologies, propelling conflicts and uncertainty (Aarikka-Stenroos & Sandberg, 2012; Corsaro, Cantù, & Tunisini, 2012; Corsaro, Ramos, Henneberg, & Naudé, 2012).

Despite these insights, extant research has remained relatively quiet about the management challenges posed by actor diversity in innovating, and offers little empirical insight into how the benefits and drawbacks of actor diversity can be coped with during the longitudinal innovation process. Thus, we need better understanding of how to facilitate diverse actors' involvement when innovating in extensive network settings. The purpose of this paper is therefore to investigate how an innovation can be managed along the full innovation process from visioning to commercialization in an extensive network characterized by actor diversity.

We define an ‘extensive network’ as a network setting which comprises a wide range of different actors and stakeholders (with regard to

* Corresponding author.

E-mail addresses: leena.aarikka-stenroos@utu.fi (L. Aarikka-Stenroos), elina.jaakkola@utu.fi (E. Jaakkola), Debbie.harrison@bi.no (D. Harrison), Tiina.makitalo-keinonen@utu.fi (T. Mäkitalo-Keinonen).

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organizational logics, goals, discourses and cultures, along with technologies and industry sectors). It can therefore include firms, public organizations, regulators and policymakers, experts, universities, research organizations, user communities and associations (see e.g. Aarikka-Stenroos, Sandberg, & Lehtimäki, 2014; Biemans, 1991; Driessen & Hillebrand, 2013). In this paper, the concept of ‘innovation’ refers to a novelty, be it a technology, product, service, process, market innovation, or new business field, diffused into the market or society (Garcia & Calantone, 2002).

Three complementary yet partly conflicting research streams provide theoretical tools for studying managing innovating in network settings with multiple stakeholders. Innovation network and innovation management studies (Powell et al., 1996; Story, O'Malley, & Hart, 2011; Rampersad et al., 2010; Perks & Moxey, 2011; Reypens et al., 2016; Driessen & Hillebrand, 2013) have focused on how to improve innovation and firm and network innovativeness by involving diverse stakeholders and external actors. Here the focus is on advancing the development of innovation via other actors' contributions but less on the actual network management.

Studies centred in the strategic network approach posit that an actor in a central position in the network can orchestrate other actors by pulling together the dispersed resources and capabilities of network members towards a goal. This aids our understanding of network management levels (functions, task, role) as enablers of innovation (Dhanaraj & Parkhe, 2006; Heikkinen, Mainela, Still, & Tähtinen, 2007; Järvensivu & Möller, 2009; Möller, 2010; Möller, Rajala, & Svahn, 2005).

The Industrial Marketing and Purchasing (IMP) approach suggests that firms can mobilize or influence other actors through relationships to achieve their goals (e.g. Mouzas & Naudé, 2007). Performing networked innovation involves creating interfaces between resources and understanding the differing logics of actors (Baraldi & Strömsten, 2009; Biemans, 1991; Corsaro, Cantù, & Tunisini, 2012; Håkansson, 2014; Håkansson & Waluszewski, 2007; Harrison & Waluszewski, 2008; Öberg & Shih, 2014).

We argue that none of these streams offers empirical studies that analyse how firms cope with extensive actor diversity along the full process of innovating. By integrating the three streams and taking a processual, longitudinal approach, we aim to develop knowledge about how to manage innovating throughout the full innovation process, particularly in extensive networks in which diverse actors collaborate for innovation. Our purpose is divided into two research questions.

Our first research question is *‘which management activities are needed in order to manage the full innovation process in extensive networks characterized by actor diversity?’* As such, we take an activity perspective on managing (Järvensivu & Möller, 2009), and consider management activities as a means for ‘mobilization’, ‘orchestration’, and ‘involvement’.¹ Although each stream above suggests that innovating in collaborative settings requires some efforts to activate other actors towards the innovation goal, we lack understanding of observable, pragmatically relevant management activities that enable involving others throughout the process.

Secondly, we address *‘how does the goal of innovation (radical vs. incremental) impact attempts at managing the full innovation process in extensive networks?’* Extant research has identified that radical innovation² necessitates creating new markets and thereby inducing new relationships and changing the structure of the network, compared to incremental innovation³ that requires modifications to existing

networks (e.g. Möller & Svahn, 2009; Sandberg & Aarikka-Stenroos, 2014). This suggests that radical innovation tends to necessitate network visioning, whereas incremental innovation requires involving partners, such as distributors, for commercialization (Järvensivu & Möller, 2009; Möller et al., 2005; Partanen, Chetty, & Rajala, 2014; Story et al., 2011). A comparison of incremental and radical innovations using longitudinal research to cover the full process is nevertheless missing. Analysing radical and incremental innovation cases would facilitate understanding the managing issues characteristic for each innovation type, and the commonalities for both types.

To address the research questions, we present two longitudinal case studies covering the full innovation process. The Electronic Prescription case (hereafter eRX) centres upon an incremental service innovation involving a range of public and private actors. The Hygiene technology case (hereafter IH), the diverse public and private actors seek to create a radical innovation that crosses industry boundaries.

The paper proceeds as follows. Section 2 provides a literature review and ends with our research framework. Next, we outline the research design. We present the two case studies in Section 4. The final sections of the paper provide a case comparison and a discussion of the main findings with theoretical and practical implications.

As its key contribution, the paper builds a comprehensive picture of managing innovation in extensive networks throughout the full innovation process. We develop new understanding on actor diversity and its influences in innovating, the extensive network as a context for innovating, and the management activities that are relevant in such settings, for both radical and incremental innovation types. We elaborate on the role of seven activities in managing innovation. Six of activities were developed from existing literature, namely goal setting, resourcing, motivating and rewarding, coordinating, controlling and consolidating. The seventh activity, leveraging, we propose from the analysis of our two cases. We also provide detailed mapping of the evolving actor diversity and extensive network setting along the full process of innovating that, as far as we know, is understudied.

2. Literature review

Understanding managing innovation processes in extensive networks requires us to discuss three aspects. The first is the innovation process itself (see Section 2.1). Second, the extensive network comprised of diverse actors (Section 2.2). The third is the management activities that are in play within the innovation process comprising diverse network actors (Section 2.3.). In Section 2.4 we consolidate these three aspects into a research framework.

2.1. The dynamic nature of the innovation process

The innovation process is depicted conventionally as a series of linear phases or stages (Cooper & Kleinschmidt, 1995). It begins with an idea, proceeds to product development, and ends with launch and commercialization. Research has highlighted that the stages overlap (e.g. Gassmann, 2006), which suggests a more dynamic, iterative process with interlinked innovation activities (Aarikka-Stenroos & Lehtimäki, 2014; Coviello & Joseph, 2012; Lynn, Morone, & Paulson, 1996).

In general, the first innovation activity – the front end – is initial ideation/envisioning and decision making on which concepts to pursue and who could be potential users (see de Brentani & Reid, 2012; O'Connor & Rice, 2013). The research and development activity follows, with the aim to develop the workable product/service, including new product development, process development, and prototyping (e.g. Lynn et al., 1996). Next, commercialization and dissemination activities involve finding the fit between the value of the novelty and the needs in the market/society, determining commercialization strategy and tactics, launching, and disseminating the novelty to the market and society

¹ We can argue that the differing ontological assumptions of the mobilizing, orchestration, and involvement approaches make them irreconcilable. In this paper, we acknowledge that all three are valid and might be empirically observable.

² Radical innovation refers to a novelty with market or technological discontinuity (Garcia & Calantone, 2002).

³ Incremental innovation refers to improvement or modification (Garcia & Calantone, 2002).

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