Beyond open innovation – the concept of networked innovation

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Abstract: The paper goes beyond open innovation and expands the research framework of networked innovation from open source communities or idea markets to more traditional industries and co-creation between partners. The paper is conceptual, and the target is to empirically research the firms’ practices of innovation process, focusing on how they utilise external sources and collaborate, in an open, or distributed and networked context of innovation. The work applies the methodology of constructive research and the concepts have been constructed and tested within several interviews and thematic group discussions with representatives of six firms. Collaboration practices of the firms in innovation have diverse forms varying between formal versus informal and open versus closed forms of collaboration. We argue that different levels of openness are a key element of networked innovation both in theoretical framework and firms’ practices. Two types of networked innovation models can be distinguished according to level of openness and interaction in their knowledge sharing: networks focusing on transaction of knowledge and intellectual property, and networks focusing to co-creation of new knowledge and intellectual property.

Keywords: networked innovation; open innovation; co-creation; collaboration; creation networks; transaction networks; co-creation networks; knowledge management; intellectual property

1 Introduction

The success of the firm depends on its strategic collaboration with other organizations that influence the creation and delivery of its products or services. Thereby, required knowledge and resources are distributed to several independent but interconnected network actors. This distributed network of actors both explores future business opportunities and influences – with their actions – to the creation of business solutions.

The key challenge to the companies is to support, contribute and utilize the networked innovation within and across the boundary of the firm.

There has been an exceptional growth in collaboration, business networks, and inter-organizational relationships – and literature related to this research area (Granovetter, 1985; Jarillo, 1993; Achrol, 1997; Ahuja 2000; Håkansson & Ford, 2002; Möller & Rajala, 2007). This great diversity in research has produced important new knowledge but has also unfortunately resulted in conceptual confusion of the network phenomenon itself (Möller & Rajala, 2007; Valkokari, 2009). Overall, even though researchers agree on the importance of networks as a new type of organizing, little is known about the challenges that the networks place on the innovation across the boundary of the firm.

Network research has pointed out the importance of external relationships since 1990 (Jarillo, 1993; Ring, & van de Ven, 1994; Achrol, 1997). Recent interests in the open innovation paradigm have the same emphasis. Using the definition of Chesbrough (2003), an open innovation means that firms make greater use of external ideas and technologies in their own business, while allowing other firms to utilize their unused ideas. This requires each firm to open up its business model, to let more external ideas and technologies flow in from the outside and let more internal knowledge to flow out to the outside. In contrast to these academic interests, empirical evidences and research on the open innovation are still focused in the field of (open source) software development or transfer of ideas and intellectual property rights. Thereby, the examples are typically from large companies like well-known “connect and develop”-model of Proctor and Gamble (Dodgson et al., 2006). However also in network research there is an intense debate about the most favourable network models (Wilkinson & Young, 2002; Andersson et al., 2007; Möller & Rajala, 2007; Valkokari, 2009).

We argue that the approach of co-creation between multiple partners is partly missing from the literature of open innovation, although according to recent interview study it is quite general in firms’ practices (Luoma et al., 2009). Thus, our target is to expand and apply the research on open or networked innovation to the more traditional industries and also to utilize network approaches. Thereby, our contribution to existing literature is a new concept of networked innovation, which analyses the degree of openness, and utilization of knowledge management approach to networked innovation.

The remainder of this paper is structured as follows. Section 2 presents the theoretical background and briefly reviews the existing research on innovation within business networks and inter-organizational relationships. Also, the definition of networked innovation is clarified and the preliminary framework is presented at the end of this section. Section 3 outlines the research methods and design. Section 4 provides empirical evidence of the networked innovation concept in the several cases. In Section 5 the observations are discussed in light of the research question. Thereby, the theoretical framework and its contribution to existing theory are evaluated shortly in this section.

2 Theoretical framework – the concept of networked innovation

Management of networked innovation is challenging and not so well understood. Main reason for that comes from the dynamics of networked innovation: objectives, actors and their roles may change depending on network’s development phases in respect to technology life cycle and innovation development process. On the other hand, it is also important to realize that these elements of networked innovation are actors – like firms –
that make their own decisions. Because an actor is a subject that makes its own decisions, it has an internal structure and itself forms a system that causes emergent changes to its business environment and innovation networks. Thereby, these operations can be expected to be nested and interacting. Thereby, innovation may also require the reshaping of the network - an organization, a firm or a community. The network perspective assumes that actors are embedded within networks of interconnected relationships that provide opportunities for and constraints on their actions (Wilkinson & Young, 2002; Brass et al., 2004; Andersson et al., 2007).

The concept of networked innovation

This conceptual paper mainly aims to systemize the relevant terminologies and their definitions, based on the openness and interaction of innovation system (Figure 1). Starting from the in-house innovation the left side of Figure 1 describes those innovation systems or networks that are clearly specified and relatively close. As a rather opposite position, the right side of the figure illustrates open innovation systems, whereas partners can be dynamically changing and unknown. These open innovation systems require radical changes in existing value systems and in the creation of new value activities. Moreover, they are characterised by uncertainties related to value activities and the actors’ roles, business models and commitment.

Figure 1 The continuum of networked innovation.

As Figure 1 presents there are several partly overlapping concepts for innovation systems and models based on different approaches. The table 1 summarizes the most relevant concepts and their main dimensions. Based on their approach the concepts emphasize the vertical relationships with customers (Hippel, 1988; Victor & Boyton, 1998) and suppliers (Dyer, 2000) or horizontal co-operation even with competitors (Dash & Teng, 2002). Whereas private-collective innovation (Stuermer, 2009) focuses on relationships between individuals and firms and user-driven innovation (Ward, 1996) to systematic adoption of user’s needs. The concept of creation nets introduced by Hagel and Brown (2006) is most similar to our definition of networked innovation seeing that there are
different forms of innovation networks. Hence, the chronological order of the concepts highlights also that ideas, related to discussion about the open innovation, are not new. Although, in a knowledge economy networked, distributed and open innovation is going to find further grounds and changes within competitive edge.

### Table 1 Summary of concepts related to networked innovation

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<thead>
<tr>
<th>Concept</th>
<th>Approach and dimensions</th>
<th>Authors</th>
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<tbody>
<tr>
<td>Co-creation</td>
<td>The challenge in strategic thinking is to find innovative ways of co-creating value with customers, a technique for finding unique competitive advantage. A pioneer in approach that emphasizes lead-customer involvement in new product development is Hippel (1998).</td>
<td>Hippel, 1988</td>
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<td>User driven innovation</td>
<td>User driven innovation is a systematic approach to develop new products and services, building on investigation or adoption of users life, identity, praxis, and needs including unrevealed needs.</td>
<td>Ward, 1996</td>
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<tr>
<td>Co-configuration</td>
<td>Victor and Boynton (1998) provide a useful historical framework for a reintegration of organization, work, and learning. They identify five types of work in the history of industrial production: craft, mass production, process enhancement, mass customization, and co-configuration. Multiple collaborating producers that need to operate in networks within or between organizations; mutual learning from interactions between the parties involved in the configuration actions.</td>
<td>Victor &amp; Boynton, 1998</td>
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<tr>
<td>Extended Enterprise</td>
<td>Competitive advantage is jointly created and shared among team of enterprises working together in intimate, trust-based relationships to develop, produce and deliver complex products. Supplier involvement and co-design are other key concepts related to extended enterprise.</td>
<td>Dyer, 2000</td>
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<tr>
<td>Alliance constellation</td>
<td>Alliance constellations differ from simple bilateral, dyadic alliances because they are a “collection of several alliances” among players in a certain industry. Whereas, strategic alliances are inter-firm cooperative arrangements between two firms, aimed at achieving the strategic objectives of the partners.</td>
<td>Das &amp; Teng, 2002</td>
</tr>
<tr>
<td>Open Innovation Co-innovation</td>
<td>An open innovation means that firms make greater use of external ideas and technologies in their own business, while allowing other firms to utilize their unused ideas. In the literature Open Innovation is also referred to as co-innovation.</td>
<td>Chesbrough, 2003</td>
</tr>
<tr>
<td>Business Ecosystems</td>
<td>Business ecosystem describes a loose network of suppliers, distributors, outsourcing firms, makers of related products or services, technology providers, and a host of other organizations, and is affected by the creation and delivery of a company’s own offerings.</td>
<td>Iansiti &amp; Levien, 2004</td>
</tr>
<tr>
<td>Creation nets</td>
<td>Creation nets implement a set of institutional mechanisms designed to mobilize independent entities in the pursuit of distributed, collaborative and cumulative innovation.</td>
<td>Hagel &amp; Brown, 2006</td>
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</table>
These creation nets are assembled by a network organizer who serves as gate-keeper, deciding who will be able to participate in the network and defines fundamental governance processes to coordinate the activities of the network.

Private-collective innovation

The private-collective innovation model proposes incentives for individuals and firms to privately invest resources to create public goods innovations. Such innovations are characterized by non-rivalry and non-exclusivity in consumption.

Stuermer et al., 2009

For the concept of networked innovation, we use the definition that Swan & Scarborough (2005) have proposed: “Networked innovation occurs through relationships that are negotiated in an ongoing communicative process, and which relies on neither market nor hierarchical mechanism of control”. We define the concept of “a networked innovation” to have the following characteristics: 1) there is always a specific purpose for collaboration, 2) although multiple actors are involved in the innovation, the collaboration is seldom open for everyone and, 3) the collaboration covers both the knowledge transfer and the co-creation activity between actors. Therefore, networked innovation is a hybrid form of organisation, having both elements from hierarchies and markets. In other words, the coordination is based on both control-governance and self-organization and there are both weak and strong ties between actors. These coordination mechanisms are critical to understanding how the networked innovation will re-shape the role and structure of the firm.

Network approach - collaboration models and innovation

Both in alliance and network research there is an intense debate about the most favourable collaboration models (Wilkinson & Young, 2002; Lazzarini, 2002; Grant & Baden-Fuller, 2004; Hagel & Brown, 2006; Möller & Rajala, 2007; Andersson et al., 2007; Harryson et al., 2008; Valkokari, 2009). Based on broad research review, Möller and Rajala (2007) distinguish the intentionally created business nets and macro-level networks of organizations. According to them, densely embedded nets with many strong ties are more manageable and beneficial. Also other authors highlight, how the collaboration within closed networks generates trust and cooperation between the actors (Ahuja, 2000), facilitate the exchange of high quality information (Gulati, 1998) and tacit knowledge (Qvortrup, 2006). For other authors, however, more “open” networks with many weak ties (Granovetter, 1985) and structural holes (Burt, 1992) have more advantages, deriving from the fact that individuals can build relationships with multiple unconnected actors and explore brokerage opportunities. In this open network configuration, actors use connections to obtain non redundant information, which can be particularly important in the identification of new opportunities (McEvily & Zaheer, 1999).

Building upon the March’s (1991) distinction between the knowledge generation (‘exploration’) and knowledge application (‘exploitation’), Grant and Baden-Fuller (2004) reviewed the different approaches, their meaning to knowledge management within alliances and show the differences between two collaboration models: knowledge acquisition and knowledge accessing alliances. According to them, this distinction of knowledge generation corresponds to the difference between “the alliances-as-learning”
Respectively to the Grant and Baden-Fuller’s approach, Harryson et al. (2008) have pointed out that exploration and exploitation of innovation rely on fundamentally different types and structures of networks. Based on these differences between network focus they describe how the networks are phased in time – starting with creativity networks for creation of new knowledge, transformation networks for transfer and integration of relevant knowledge and process networks for implementation of the results. Concurrently, firms have to pass from analysis to synthesis to be able to create new opportunities. Still, the value of this new solution can be evaluated only within its environment. Thereby, the firm’s competencies, business model and its position in value networks are important elements of evaluation.

Based on differences in network structure Hagel and Brown (2006) categorize creation nets to: “practice networks”, which rely on looser forms of coordination and “process networks”, which require more active forms of coordination. Similarly Lazzarini (2002) indentified two types of alliance constellations: explicit and implicit. Explicit constellations involve formal, publicly known agreements with a multilateral fashion in that such agreements tend to be broad and general, i.e. applied to all members. Implicit constellations, by contrast, are informal groupings “implied” from the structure of bilateral agreements between firms, in such a way that members have relatively more bilateral ties to one another than to firms outside the constellation.

Knowledge management within networks and networked innovation

The concept of tacit knowledge refers to a knowledge which is only known by an individual and that is difficult to communicate to the rest of an organization. The opposite of tacit is explicit knowledge, has been or can be articulated, codified, and stored in certain media. Thereby, explicit knowledge can be more easily transmitted to others as tacit knowledge has a limited capability for transfer. Still, according to Polanyi (1966) all knowledge has a tacit component. This component is often connected to knowledge and understanding about conditions of knowing and it makes transfer of knowledge from one place to other - i.e. across the boundaries of firm or research institute - challenging (Qvortrup 2006).

In spite of this multidimensionality of knowledge, we utilize the division to two types of knowledge as our focus is on management – e.g. sharing and protection – of organizational knowledge. Thereby, we expand the utilization of the model of Grant and Baden-Fuller (2004) from horizontal alliances also to vertical networks between non-equal actors. Based on this we re-name the two collaboration models introduced by Grant and Baden-Fuller (2004) and divide the networked innovation to two categories: transaction and co-creation networks as presented in table 2.
Table 2 Two types of networked innovation models

<table>
<thead>
<tr>
<th></th>
<th>Transaction networks</th>
<th>Co-creation networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of knowledge</td>
<td>Explicit knowledge, IPR managed by formal methods (patents etc.)</td>
<td>Tacit knowledge, possible explicit background IPR, shared interests between partners</td>
</tr>
<tr>
<td>Legal protection</td>
<td>Clear</td>
<td>Unclear</td>
</tr>
</tbody>
</table>

In these networked innovation models nature of knowledge has the two dimensions: explicit and tacit, as introduced by Polanyi (1966). Legal protection of the knowledge differs in these collaboration models. Within closed transaction networks explicit knowledge, like intellectual property rights, is simply transferred from one actor to others, whereas within co-creation networks there are always some kind of relationships and interaction between the actors. Because of interaction and several connections between the firms the results of co-creation networks are not known beforehand and that makes the legal protection of intellectual property unclear, as shown in Lee (2009). Hence, we argue that the research of open innovation is still quite focused to these in-bound and out-bound transactions between the companies. On the other hand the research about co-creation between multiple partners, which is quite general in firm practices, has received less attention in the literature. So, our target is to expand and apply the research on networked innovation to the more traditional industries and also to utilize knowledge management approach to networked innovation.

3 Research methodology and design

Contingency theory, originally developed to explain the structure of organisations by particular circumstances (e.g., Lawrence & Lorsch, 1967), has also been adopted to explain the shape of management systems and mechanism in networks or communities (Stam, 2009; Valkokari, 2008; Möller & Rajala, 2007; Kajüter & Kulmala, 2005; Tomkins, 2001). Likewise, in light of the contingency theory we assume that, knowledge needs and collaboration models in networked innovation vary according to the specific purpose of the relationships as described in table 2. Thereby, the objective of the study is to describe and compare the networked innovation practices of sampled firms.

Because an in-depth understanding of a little studied area was needed, a qualitative research approach was chosen. A case study strategy is appropriate when the research problem is of the ‘how’ or ‘why’ type (Yin, 2003). As the present study has an interpretative orientation and aims to understand the phenomenon from inside rather than outside, also the research problem of the study represents a ‘how’ form. The main question of this study is to explore how firms understand and manage networked innovation, e.g. collaboration and joint innovation that involves multiple actors. This is further implemented through several research sub-questions, considering the collaboration and innovation practices of firms:

- Who are typically involved to the collaboration and innovation processes?
• What kind of collaboration practices the firms have (balance between formal versus informal and open versus closed collaboration)?

• How do the firms share and protect their knowledge?

• How do they treat the outcome of the collaboration? (e.g. intellectual property rights, tacit knowledge?)

According to Lukka (2000) a constructive research approach includes achieving deep understanding both empirically and theoretically about the studied subject. In this case the concept of networked innovation and knowledge management models of networked innovation form the theoretical framework. According to the principle of constructive research approach they have been constructed and tested within several thematic group discussions and interviews with the representatives of the firms. Altogether representatives from six firms take part to discussions. The firms all are B-to-B companies, but the size of companies varies from a small software firm with 20 employees to a large technology companies with over 2000 employees. The scope of our analysis is management of networked innovation, and in particular the research concerns the relationships and interaction between network actors.

4 Research and findings

In this section we present some findings of case studies based on the application of the networked innovation concept and two models of networked innovation. Subsequently, these observations are discussed in light of the research question in next section. At the first phase, the research has focused on reviewing how firms utilize networked innovation, with whom they collaborate and what collaboration practices they have. Thereby, we intent to study, if these practices support or hinder innovation between network actors.

Figure 2 represents the typical collaboration partners and benefits to these partners identified by firms’ representatives. This description of typical collaboration models is based on the theme discussions and interviews with representatives of companies. Based on this case data we have studied collaborations with several types of partners: customers, suppliers, competitors, public authorities, communities, research centres, universities and individual innovators. Thereby, we have been able to gather up different collaboration practices of firms in order to compare knowledge management approaches in different circumstances.
As Figure 2 shows the firms have quite traditional models to utilize networked innovation. Typically, the open source communities and standardisation work were almost the only open collaboration models identified by the representatives of sampled firms. Whereas the firms had several closed but interactive joint-development projects with their customers, suppliers and research projects with innovators or research institutes. Still, also the direct knowledge transfer, selling or buying IPR or other explicit knowledge, between the firms was quite rare. Table 3 summarizes and compares the collaboration practices in more detail.

Table 3 Summary of group discussions related to research questions

<table>
<thead>
<tr>
<th></th>
<th>Transaction networks</th>
<th>Co-creation networks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target of collaboration</strong></td>
<td>Exploitation of existing knowledge (selling and buying)</td>
<td>Exploration of new knowledge and approaches or solution to problem</td>
</tr>
<tr>
<td><strong>Collaboration partners and network roles</strong></td>
<td>Software companies share their source code with OSS community under the appropriate licenses</td>
<td>Software companies take part to OSS communities to develop new competences</td>
</tr>
<tr>
<td></td>
<td>Larger technology companies license-in technical solutions, also mergers or acquisitions can be a model to access external knowledge</td>
<td>Larger technology companies have relationships with innovators in order to develop new solutions. They also take part to several research projects to gain new knowledge (commercial products is not a focus)</td>
</tr>
<tr>
<td></td>
<td>Lead suppliers are expected by the customers to take part to the process development although the results will be owned by customers and customers do not open their own knowledge.</td>
<td>Small KIBS companies or research institutes operate as innovation mediators in order to configure the project group</td>
</tr>
<tr>
<td><strong>Collaboration</strong></td>
<td>Preparatory work for future</td>
<td>Collaboration can be based on</td>
</tr>
</tbody>
</table>
practices (formal versus informal) collaboration can be informal, but usually collaboration starts with NDA.

Knowledge sharing, protection and outcomes Firms target to ownership of new solutions and technology. Key challenge is identifying relevant new ideas developed externally and gain access to them.

Informal discussion in order to get new approaches. Closed joint-development projects start with NDA and collaboration agreements. Results (or rights to utilize results) will be shared according the business areas of participants. Identification of background knowledge and agreements about its protection is one of main issues in collaboration agreements.

Table 3 points out that firms often have traditional practices and intention is not to share the results of networked innovation. Nevertheless, it can be stated that the challenges of knowledge management faced by actors in co-creation networks trying to create new knowledge and future business opportunities with multiple partners, are markedly different from those faced by actors in transaction networks focusing to knowledge transfer between partners.

The discussions with the firms showed that overall perspectives of competitive edges in the sampled firms are already changing. Since the firms’ representatives understanding about networked innovation deepens also their ability to manage it improves. We found differences according to the industry type, the size and the network role of the firms in their responses to open and networked innovation. For a small software company, the scope of sharing is broad and sharing occurred even in the core knowledge at the core area of their businesses. Whereas larger technology industry firms have just perceived that within some conditions it might be beneficial for them, if the technology they have developed with their partners will become broader utilized. In industries, where product life cycles are quite long, it’s more important to have agreements about IPR before development work and firms also have “more time” to wait contracts. Hence, a critical review between sharing and protecting own knowledge base could offer firms radically new innovative solutions.

At the fuzzy end of innovation process, where it is often impossible even define the future business solutions or required knowledge, the sampled firms utilize more co-creation networks than knowledge transaction networks. Thereby, the informal discussions with other firms’ representatives are an important source of new approaches and knowledge. In order to ensure the open discussions within a project group it is important to understand the benefits and interests of partners and construct group where the interests are in appropriate balance. In several cases the consulting companies, which focus on knowledge intensive business services, have had an important role in configuring these co-creation networks or project groups.

Based on theme discussion we realized that in practices of firms it is important to distinguish between the different types of networked innovation. The role and network position of the firm are critical factors in order to select suitable innovation network development and knowledge and IPR protection methods. The firms in B-to-B-sector do not usually collaborate and innovate with un-known actors (e.g. communities), although this kind of approaches is already becoming common within B-to-C-companies.
5 Conclusions and practical implications

Our concept of networked innovation and distinction of two types knowledge management of networked innovation do not provide a complete solution to the puzzle of networked and distributed innovation, and how it relates to open innovation. In particular, by connecting the network approach to open innovation, the concept of networked innovation enriches the field of research and allows research in the traditionally closed industry. As also Lazzarotti and Manzini (2009) argued, the empirical evidence shows the existence of the “different degrees” of openness in networked innovation.

Research questions

This paper addressed four questions regarding the firms’ practices within the networked innovation.

First, we analysed with whom the firms typically collaborate and innovate. We realized that sampled firms have quite traditional and well-known partners within their innovation processes. Thereby, the innovation brokerage services – virtual platforms, knowledge-intensive business service (KIBS) companies or even research institutes – could be one solution to boost the firm’s collaboration between new partners. In addition to innovation brokers also the social networks influence to the utilization of networked innovation: enabling the firm to both seek out and forge effective relationships with appropriate partners.

Secondly, we studied what kind of collaboration practices the firms have and compared the balance between formal versus informal and open versus closed collaboration. Based on the interviews and theme discussions we noticed that close collaboration and joint-development projects are the most important collaboration models. Although, the first discussion can be informal, the sampled firms counterpointed the need for NDA’s and agreements about sharing the results. Thereby, the composition of project group was critical, the firms highlighted that co-creation with competitors was not desirable. Again, the innovation brokerage services, like KIBS companies, can have an important role in building these networks. In order to have mutually beneficial collaboration within the project group, it is important to understand what could be the benefits of the collaboration to each of the participants.

Thirdly, we examined how do the firms share and protect their knowledge. Within a closed co-creation network, like project group, the companies share their knowledge and discuss quite openly. Still, identification of background knowledge and agreements about its protection seems to be one of main issues in collaboration agreements. Naturally, this reflects also to composition of project group: discussions and interaction are open only, if interests are not conflicting, e.g. there is not competition between the parties.

Finally, we also questioned how the firms treat the outcome of the collaboration – both the explicit knowledge, like intellectual property rights, and tacit knowledge. The focus of sampled firms was clearly in management of explicit knowledge they did not even recognize the tacit dimensions of knowledge created within collaboration. Hence, these explicit results or rights to utilize results were quite often shared according the business areas of participants.
Practical implications

The firms and their managers have to open their knowledge and networks in order to create new business opportunities in complex business environment. Specifically, to manage distributed and networked innovation, it is necessary that managers (1) clarify the roles and the responsibilities, (2) consider conflicts of interest, (3) anticipate comparisons between networks and other forms of collaboration, (4) create and manage contracts in a mutually beneficial manner, (5) share and recombine knowledge to build unique intellectual properties to all network actors, and (6) continuously evaluate collaboration and partners. During all stages of such networking processes, a firm has to deal with explicit and tacit knowledge needs, the search for competencies, and the use of available intellectual property. Hence, intellectual property strategy of firms should be better connected to collaboration models and utilization of external resources or knowledge – as pointed out also by Chesbrough (2006).

Limitations and further research

The contributions of this study must be viewed against some limitations. First, the case data about practices of networked innovation is based on interviews and theme discussions with limited number of firms. Still, the study points out that, firms need new concepts to understand and manage networked, open and distributed innovation. Further studies based on the action research and more detailed analyses could shed more light how to manage mutually beneficial collaboration and how the firms can balance between the open and close dimensions of networked innovation. On the other, with a quantitative testing of research framework further research would examine how utilization of different models of networked innovation influence the financial performance of companies.

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