Barriers to Innovating Openly

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Abstract: The paper describes findings from an interview study about what are companies seeing as barriers to innovating openly. Most of the open innovation literature focuses on the opportunities of innovating openly, but companies will face new challenges and risks when opening up their innovation process and having external actors in their network to develop innovations. A total of 40 companies and public organisations in Finland and in the Netherlands were studied using semi-structured face-to-face interviews. Qualitative research approach was applied to create an understanding of the barriers. Barriers identified in the study include factors related to culture, resources, business model, management of intellectual property (IP), partners and management of collaboration network in general. We argue that barriers identified in the interviews can be categorised into two main categories: company-specific factors and in environment-specific factors related to collaboration network and industry practices.

Keywords: open innovation, barrier, challenge, inter-organisational relationships, interview study

1 Introduction

What hinders companies to innovate openly? In the literature of innovation, inter-organisational cooperation has been advanced as being beneficial for the innovative performance of companies (e.g. Faems 2005). The importance of cooperation has been well understood, and cooperation with other parties – e.g. suppliers, customers, research organisations and universities – is common. Opportunities to develop new successful innovations are higher by the means of cooperation but the cooperation also brings new risks (Pisano & Teece 1989), especially if the purpose is also to open up the innovation process (Valkokari *et al.* 2009). The open innovation paradigm offers a promise to companies that they can achieve a greater return on their innovation activities and intellectual property (IP) by loosening their control over both (Chesbrough 2003). The competitive advantage may come either from inbound or from outbound open innovation. (Chesbrough & Crowther 2006).

Still, the term "open innovation" as an expression is not uncontested and it may create confusion in the companies. Especially the prefix "open" may create different kind of presumptions. (Luoma *et al.* 2009, Fasnacht 2009) Thereby, it is important to notice that openness may mean different things to different people. The empirical evidences show the existence of the different level of openness in networked innovation (Lazzarotti &

Manzini 2009, Valkokari *et al.* 2009). Whereas also literature has suggested that utilisation of more open models of innovation necessitates practitioners to describe, "What is open, to whom is it open, and how open is it?" Still, most of this literature concerns the software industry (and open source software development) whereas our intention is to broaden the study about barriers to innovating openly to industries that are more traditional. Thereby, it is important to notice, as Bauwens (2009) points out, that an open model of co-creation of immaterial products, like software, cannot directly adapted to physical production. Maxwell (2006) defines two key attributes, which determine a work's degree of openness: its availability and accessibility[1]. He completes the definition to include that openness also depends on work's responsiveness – in other words on the potential for modifying it based on contributions from others.

In this study, we explore the barriers to innovate openly by presenting practical examples of barrier factors that emerged from the interviews, and conclude by classifying these single barrier factors according to two categories, environment-specific factors and company-specific factors, which each also contain several sub-categories.

2 Framework of the research – challenges for applying open innovation

Open innovation stresses the importance of external collaboration, implying that groups of companies can operate on a larger scale, and open innovation offers alternative pathways to benefit from knowledge and develop new innovations (Chesbrough 2003). In the literature, the focus of open innovation is usually on the benefits (e.g. Chesbrough 2003, Chesbrough *et al.* 2006). Thereby, the empirical evidence of possible barriers is scarce.

Concurrently, we point out that it is important for the future competitiveness of firms to appreciate and be able to distinguish between the different modes of collaboration and the contingencies, and when to open their innovation process and to whom. Thereby, we suggest that the possible barriers faced by the companies when adapting open innovation in praxis can be categorised into two main categories: company-specific factors and environment-specific factors, e.g. related to collaboration network and industry practices.

Company-specific factors

West & Callagher (2006) identify three management challenges of open innovation from the open source (OS) viewpoint: maximising, incorporating and motivating. Motivation becomes a management challenge when managers think about how to insure that the stream of external innovation is replenished. Identifying relevant external knowledge and incorporating it into the company's innovation activities is also challenging. Even if external innovations are identified, it does not mean that they are automatically incorporated into company's daily practices. (West & Callagher 2006)

According to Chesbrough & Crowther (2006), the open innovation process could just

[1] The creator of a work protected by IP laws has the right to "exclude" others from its use – potentially to exclude all others and preclude almost all uses until the "limited" term of protection ends. Such a work would be considered largely closed, although some limited access to the work may be permitted under exceptions to IP protection. Eventually, after many years, the work would become open as it passes into the public domain. Then, the work is almost entirely open, available to anyone interested in it.

be a set of *ad hoc* processes in the company. Defining practices, systems, roles, and responsibilities clearly can help to ensure the successful adoption of open innovation across the organisation. (Chesbrough & Crowther 2006) Pykäläinen (2007) divides company strategies of software development into three groups: open (e.g. 'we share everything'), mixed (e.g. 'we share some things and some rights are reserved'), and closed (e.g. 'we share nothing').

Open innovation may also face biases among company personnel. Chesbrough & Crowther (2006) identified the not-invented-here (NIH) syndrome and the lack of internal commitment as main barriers to open innovation. Concurrently, van de Vrande *et al.* (2009) identified barriers mostly related to corporate organisation and culture in their study of open innovation practices in SMEs. Enkel *et al.* (2009) identified some significant internal barriers for SMEs in applying open innovation, such as difficulties in finding the right partner, imbalance between open innovation activities and daily business, and also insufficient time and financial resources.

When it comes to maximisation, companies need a wide range of approaches to maximise the returns of internal innovation: also, outbound open innovation practices are needed (licensing-out IP, patent pooling, etc.). Companies may generate, for example, a large patent pool from which not all the IP produce a direct economic benefit, but may indirectly be beneficial through spillovers. (West & Callagher 2006) Furthermore, Keupp & Gassmann (2009) point out that open innovation implies cost and risks, which should not be underestimated – for example, IP considerations may hinder the implementation of open innovation. We argue that most of the above factors are company-specific and related to the *company's strategy and management, business model, IP management practices, resources, and even the individuals and cultural issues.*

Environment-specific factors

Maxwell (2006) points out that the open model of innovation rests on several assumptions: (1) creative acts take place for a variety of reasons; (2) the value of a creative work can be increased by sharing the work and allowing, even encouraging, more potential innovators to contribute to its development; and (3) economic value can be enhanced by such sharing. Grand *et al.* (2004) define open source innovation model as hybrid form of innovation between private and public innovation models. In open source innovation models, it is therefore important to understand the logic of the mutual benefits and joint interests of all parties involved, as well as the inherent dynamic and cumulative nature of these interactions leading from one level to the next. Enkel *et al.* (2009) studied open R&D and open innovation in SMEs and identifies some risks and barriers related to networking, such as loss of knowledge, higher coordination costs, as well as loss of control and higher complexity.

The open innovation paradigm asserts that companies should profit from each others' use of IP for advancing their own business and licensing can help achieve this (Chesbrough 2003, Chesbrough *et al.* 2006). In general, certain industries have historically different licensing practices (Hanel 2006) which may create different kinds of challenges between industry sectors. When the focus is on open innovation and licensing of IP, differences in open innovation practices between sectors mentioned by some academics seem to decrease (van de Vrande *et al.* 2009, Lichtenthaler 2008). Manufacturing firms are on average more active at outsourcing R&D and licensing out

IP, but they do not differ from service firms on other open innovation activities (van de Vrande *et al.* 2009).

Lichtenthaler (2008) concluded that there are no significant differences between industries in open innovation practices. However, not all the industry sectors and their open innovation practices are widely studied. According to Luoma *et al.* (2009), licensing activities exist in the companies, but the volume is very small compared to the company's other activities. In general, few companies actively license (Luoma *et al.* 2009).

We argue that most of above factors are related to *partners, collaboration network management* and even if open innovation practices are not dependent on the industry sector there may be *some industry-related barriers to applying open innovation (such as cultural issues and IP management practices).*

3 Research question and methodology

Cooperation is an instrument for creating new knowledge to the company and for developing and commercialising new innovations in conjunction with each other. Companies will face new challenges and risks when opening up their innovation process and integrating external actors into their networked innovation processes. Most of the current open innovation literature focuses on the *opportunities* of innovating openly. Much less attention has been paid on the *challenges* of innovating openly. In this paper, we focus on the barriers in accordance with the main research question of the study:

What do the companies perceive to be barriers to innovating openly?

Answers to the research question are based on a large interview study done by authors in 2009, where 54 managers from 40 organisations in Finland and in the Netherlands were studied. Semi-structured theme interviews were chosen as the main source of empirical material, because the study was partly explorative in nature and the meanings of concepts needed to be negotiated with the interviewees.

The empirical material was collected by a group of 5 researchers (including the authors of this paper). The duration of a typical interview was about 1 – 1,5 hours, and each involved two interviewers. The corresponding author of this paper partook in every interview, which made it easier to create similar approach to each interview.

The organisations were established, globally operating Finnish and Dutch companies and public organisations. They represented different fields of industry and different sizes, bringing diversity to the empirical material and maximising the learning and variety in the data (see Table 1 for details). The interviewees were occupying senior corporate, R&D, business unit, innovation or IP management positions.

The interviews went beyond challenges in open innovation to cover themes on the inter-organisational relationships and IP management in networked innovation. In this paper, we focus on the theme about inter-organisational relationships and cooperation and exclusively on the barriers to innovating openly. The results of the IP management in networked innovation have been reported elsewhere (Luoma *et al.* 2009).

The interview study began by enquiring into company practices in cooperation with other parties. Especially of interest were their practices in utilising ideas and IPs from outside the company, licensing practices and challenges they have faced. Questions and discussions about joint development and inter-organisational relationships – for example, without mentioning the term "open innovation" – were also raised. The idea was to first

absorb the companies' lingo and only later ask about the term "open innovation" if they did not use the term themselves. The study focused on business-to-business (B2B) relationships because the interviewed companies were operating more on B2B markets.

Analysis of the empirical material proceeded the application of the grounded theory approach (Bryman & Bell 2007) and computer-assisted qualitative data analysis software. Open coding "the process of breaking down, examining, comparing, conceptualising and categorising data" (Strauss & Corbin 1990) was applied to the empirical material as coding process for detecting barrier factors – the main viewpoints to the data. The chosen viewpoints were not defined beforehand but they emerged during the analysis of the interview material.

In order to assist the categorisation, the barrier factors were presented and discussed in two thematic group discussions, where the interviewed companies were represented together with researchers. Lessons learned from the interview study and thematic group discussions were combined with findings from the literature in order to complete the results of the study.

Table 1 Interviews – 40 companies and 54 managers.

Organisation	*Industry / products / services*	*Personnel (2008)*
ABN Amro	Finance, banking	50 000
Arcusys	IT services	12
Blancco	Software, ICT	37
Consolis	Construction industry	9 000
Corus Group	Steel industry	42 000
Damen Shipyards	Shipbuilding industry	2 100
DSM	Chemical industry	23 000
Dun Agro	Agriculture	3
Forcit Defence	Chemical industry	5 (Forcit 220)
Fugro	Technical consultancy, geospatial industry	13 000
Image Wear	Clothing industry	500
Imtech WPS	Parking technology systems	150
Kolster	IP Management services, patent and trademark office	200
Koppert	Biological systems – pollination systems and integrated pest management	250
KPN	Telecommunications and ICT services	43 500
Krohne Altometer	Technology products and measurement solutions	315
Laitosjalkine	Textile and footwear industry	80
Medisize	Manufacturing industry	1 000
Metso Automation	Industrial automation industry	1 500
Nammo	Defence industry	1 800
National Board of Patents and Registration of Finland	Government services, IP industry	500

Organisation	*Industry / products / services*	*Personnel (2008)*
Nederlands Vaccin Instituut (NVI)	Healthcare industry	400
Nokia Research Center	Telecommunications	500
Norit X-Flow	Water purification systems	1 600
Outotec	Metals & Mining industry	2 000
Philips Lightning	Lightning industry	40 000
Rabobank	Finance, banking	60 000
River diagnostics	Measuring and testing equipment, healthcare and medical industry	26
Sandvik Mining and Construction	Mining and construction	17 000
Stevens íde partners	Engineering and Designing	10
Strukton Rail	Railway construction and maintenance services	3 500
Tamlink	Technology transfer	70
ThyssenKrupp Accessibility	Accessibility industry	1 100
Tremco Illbruck	Building material industry	1 000
UPM	Forest industry	24 000
Vaisala	Measuring and testing equipment	1 100
Vebego	Cleaning, facility and personnel services	30 000
VTT	Research and development	2 700
Wihuri Oy Wipak	Plastics industry	3 600
Xsens Technologies	Measuring and control instruments	40

4 Challenges faced by companies when innovating openly

The results of the interview study are presented over two chapters. In this chapter, we present central findings from the interviews – examples of single barrier factors emerged from the interviews. The subsequent chapter "Discussion and conclusions" provides the categorisations of single barrier factors and related discussions.

Company-specific barriers to innovate openly

Chesbrough & Crowther (2006) concluded that in companies the open innovation process might just be a set of *ad hoc* processes. Our interview study revealed several company-specific factors, which may act as barriers when applying open innovation.

Several interviewees mentioned **cultural issues**, e.g. cultural change, understanding open innovation paradigm, different levels in openness, the outcome of open innovation, finding internal entrepreneurs and communication problems as reasons for not utilising outside ideas and IPs in their innovation process, or on the contrary, letting others use

their ideas and IPs. One interviewee answered the question about innovating openly and culture thus: *"Open innovation is hard because it has to do with culture. It's not our culture to cooperate with all kind of other companies and people on these kinds of things."*

Foremost, the company and its employees should understand the meaning of open innovation, how to apply open innovation and what to expect from it**.** Our interview findings showed that nearly all respondent companies have cooperation with other parties and many of them are unconsciously utilising open innovation to some extent. However, the term "open innovation" is not very familiar expression to them. Only about 20% of the interviewed companies understood the meaning of open innovation and utilised it in their business consciously. The term open innovation was new or confusing to about half of the interviewed companies. The statements *"It's a buzzword"* and *"It's a suggestion box"* were used to describe the situation. And even for those interviewed companies who were familiar with the term "open innovation" it may mean different things. As an example, one interviewee compared open innovation with fishing, *"…open innovation is constant fishing for ideas"*. Another interviewee responded that open innovation is cooperation at an early stage of innovation process.

Many of the interviewed companies were equating open with public. However, open does not mean same as public, in which everything is open to everyone (Valkokari *et al.* 2009). It is not easy to recognise that there are different levels in openness. One interviewee was wondering, *"But how open do you want to have it?"*. On the other hand, the expectations for the outcome of open innovation may be too high, which presents other obstacles to open innovation. And the image about the likelihood of getting potential IPR from open innovation may not meet the reality, as one interviewee mentioned *"…the likelihood of getting potential IPR in open innovation is probably not that big."* Another interviewee clarified the outcome of open innovation, *"Not all the open innovation experiments are going to be successful."*

The company's **business model** has a significant impact on how to apply open innovation. The following are interviewee's responses to the question on how the company's business model and cooperation characterise the importance of understanding the company's core business: *"The only thing is, which I always point out in the beginning of the cooperation, you have to figure out first, what is absolutely core. Something, which I will never share."* In addition to understanding the core business, the flexibility of company's current business model is essential. The words of this interviewee explain why: *"…because they (senior management) have to understand that there's a shift in business model, and we need open innovation to help us to make that shift. Open innovation itself should create a completely new, different business model. And that needs to be communicated as well, and to be fully understood on the consequences it has on us."* A company may also have a strong belief in their business model and does not recognise new opportunities, especially from new business areas. It is tough to understand how their own IP (e.g. patents) could be utilised in other industries. The company may not see the inside-out approach.

Other possible barrier factors were related to the **company's strategical selections and management practices**. The lack of flexibility in the ownership of the company and excessive bureaucracy may complicate the cooperation. One interviewee mentioned, *"Mainly what we do in open innovation is, results in joint ventures. It's something that we can do as a family-owned company, because for most of the companies listed at the stock exchange it's more difficult to deal with joint ventures from a more administrative and*

legal point of view."

Company image may complicate or even hinder finding suitable partners, if the company is not desired in the innovation markets, *"…has a bad name, a bad reputation in the innovation market."* Sometimes the barrier may lie in the speed of the innovation process, *"You do open innovation if you can run faster than the others. So if you stay on top of the game yourselves then that is OK."*

Intellectual property management may cause difficulties in open innovation if no clear instructions exist – e.g. how do you select the method for IP protection. As an example, *"How you deal with IP in open innovation, there is no single form out"*. IP and open innovation were seen as a difficult combination for those companies that were innovating openly and/or aware of the term "open innovation". As an example, *"Open innovation and IP contradicts a bit"*.

For instance, licensing may not be a normal mode for operation in the company and the company may not be used to licensing. Patenting may also be done only in the core business of the company, thereby complicating licensing possibilities. Another example of IP management challenges when innovating openly is that the buying of IP outside-in can not be made according the pure open innovating paradigm, especially when the companies are developing new radical innovations to new business areas. In such situations, the company may need to have even more in-depth cooperation with the company with whom they have developed the IP – they need to have the knowledge behind the IP – in other words, the cooperation is more like a joint development. Our interview findings are in line with the results of Keupp & Gassmann (2009) with regards to IP considerations being possible barriers for the implementation of open innovation.

Open innovation needs also **resources** for having concrete results. The following two quotations describe the situation:

> *"One of the disadvantages of open innovation is that where you innovate openly there's no money."*

> *"Everybody sees the complexity of the idea. Bringing it to the market is a very complex game to play. So the idea is just a plain idea, people do not want to take many risks. Also maybe the business model is good, and there can be earned a lot of money, but doing it whilst having an ongoing business is very difficult."*

Motivating people to innovate openly is challenging (Antikainen *et al.* 2010). One interviewee clarified the rewarding of people, *"The idea was, people come up with an idea and I want to give them a reward for the idea in the very minute they come up with it. Well that is not possible, I cannot say thanks, good idea, here you get some money. It takes time."* Our interview findings are in line with van de Vrande *et al.* (2009) who identified barriers mostly related to corporate organisation and culture.

Open innovation is nothing without **individuals**. Even if a person has a brilliant innovation, they may not recognise how to utilise it in their business and how to transform it into a business concept. For example, one interviewee mentioned, *"You need people that are open to innovation, people that have been in the job for a couple of years that understand the business, that understand the technology, and then they can make the link."*

Environment-specific barriers to innovate openly

When innovating openly, difficulties associated with the operational environment of the company may arise – such as the industry and the collaboration network configuration and management-related factors. Some examples of possible barrier factors related to the environment were garnered from the interview study.

Some barrier factors were related to **partners and collaboration network management**. First of all, the company may not recognise possible partners from the network. And when the company is searching radical innovations from a new business area, it may be more difficult to find new reliable partners. The number of possible partners in the industry may be limited. Especially if the company is operating in B2B markets, the number of possible partners may be smaller than in business-to-consumer (B2C) markets. In the words of one interviewee, *"I myself have done work in B2B business. It bothers me that in B2C business there may suddenly be one million customers for new solutions. We have about ten customers and some dozens of suppliers. The innovation field is much more limited."*

In addition, it may be difficult to understand partners and negotiate with them. The companies may not speak the same language and the common outcome is hard to achieve. It is important to understand relationships behind the open innovation, *"If you do an open innovation it's much more about these other players… what are their strategies? If we will do this, what will they do and try to figure that out up front. It only makes sense if you really know the different players. If you do not know the player, also that has no value. Because then you start dreaming."* Competitive relationships can be hidden and it may stop fruitful cooperation in spite of attempts to create trust, mutual understanding and successful cooperation. The more unknown a partner is, the more difficult is to find hidden agendas. For example, one interviewee stated, *"…competitive relationships with implicit relations don't fly."*

Open innovation may also be costly. In companies, "open" is often referred as "free" but the reality may be quite different. According to one interviewee, the network management is costly, *"How much does it cost to bring people together, formulate contracts, facilitate sessions, collect and filter ideas? What are the ways to do open innovation and what does it cost in reality?"*

In addition, the contracting process may lead to troubles in innovating openly, if the agreement is presented at a wrong moment, or completely left out, or relies only on trust. The following two examples explain the situation:

> *"…a confidentiality agreement is the first thing you are doing or not have it at all… The reason for not having it is that, it's not only that you're afraid of your own IP leaking away, but you also don't want to be contaminated with IP from others. Because, if in such a brainstorm, somebody comes with a brilliant idea and it's already being done in your lab… they may say, well we thought about it in that meeting, so now it's ours. So, it's very important that you protect yourself."*

> *"…you have to make sure that, from the personal relationship, it [trust] goes to a company relationship. And therefore, we need the confidentiality agreements to secure that."*

Nonetheless, trust is an important value in cooperation. Many of the interviewees emphasised the importance of trust. One interviewee described the problems with relying on trust in following way, *"Trust works on the short term but in the long term, you never know, companies are bought, they're sold."*

The IP management practices may also vary in different industry sectors. There may be differences for the content of the patent in different industries. For example, in the machine industry, the patents may be so focused to a certain part of a machine that they are difficult or even impossible to adapt to any new context. In other words, the nature of the patent is so specific that licensing is difficult or even impossible. Also, there are differences in the patenting habits in different industries as Hanel (2006) concluded. For example, in the IT industry, the patents may be more applicable to other applications in other industries than perhaps to the machine industry. Secondly, the intent to file a patent may vary according to industry sector, company, university, etc. For example, some universities are keen on making money from patents, *"But what you see more and more now, in my perspective, a showstopper for a lot of innovation that, professors are trying to become entrepreneurs".* Another hurdle is linked to the fact that the industry is not accustomed to licensing, which may act as barrier when innovating openly.

Cultural issues may complicate cooperation with other companies, as one interviewee mentioned: *"Every company has its own cosmos… own language."* Exploitation possibilities of open innovation may differ between industry sectors. One interviewee mentioned difficulties in starting open innovation, *"…I think the IPR creation is more in the deeper technology area, and open innovation is generally probably more software based, where IPR is even somewhat harder to get…"*

There may be also differences in the **regulations** and **legislation** between industry sectors that complicate innovating openly. For example, the competition legislation was mentioned several times as a barrier to cooperation.

5 Discussions and conclusions

Opening up the innovation process brings new variables to the table, when compared to in-house innovation. Open innovation and IP are seen to be a difficult combination for those companies that were innovating openly. It can be managed, but there are also many possibilities to failures. One key question associated with the collaboration is "How much are the actors innovating together are actually willing to share their knowledge?" In order to gain benefits from innovating openly, companies need to find new reliable cooperation partners, and consider and understand them from multiple viewpoints. In addition to these external challenges, opening of the innovation process may challenge also many of the existing internal practices and norms of the company.

Based on the empirical results, the challenges faced by the companies when innovating openly can be summarised into two main categories: company- and environment-specific barriers. The category of company-specific barriers contains sub-categories, such as the business model of company. The category of environment-specific barriers contains sub-categories such as partners and collaboration network management. IP management and cultural issues can form barriers both inside the company and in its business environment. The barrier categories to innovating openly identified in the study, are summarised in Figure 1 (in alphabetical order because the importance of each category was not studied).

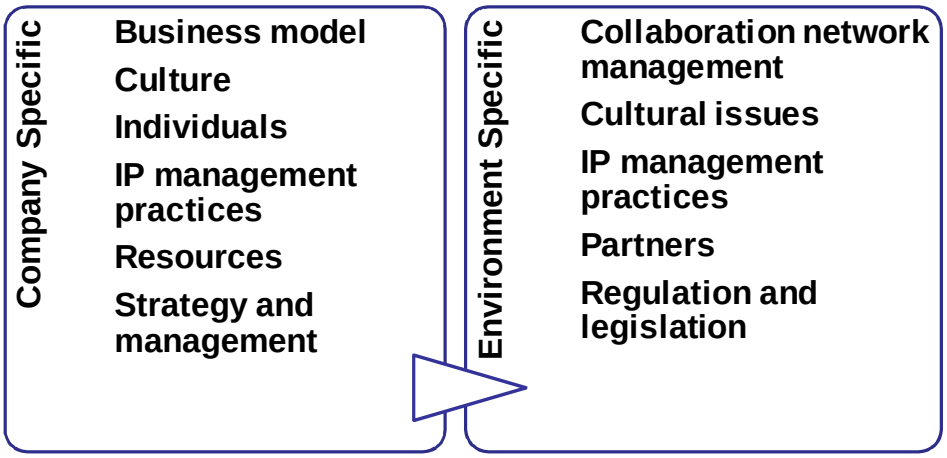

Figure 1 Barrier categories to innovating openly.

In addition to the theoretical contribution of barrier categories, the paper gives practical viewpoints on risks related to open innovation that may help practitioners to benchmark practices in other companies and to give feedback to managers for conducting open innovation successfully in practice. The paper may also help researchers to see the management of open innovation in a broader context, for example, to also include a risk perspective.

The empirical material for the paper was collected as a part of larger study on inter-organisational innovation. The approach brought a good general insight to the subject of the paper but limited the depth of the study. Accordingly, all important viewpoints might not come up in the interviews and our results may not cover all the important barriers to innovating openly. Furthermore, our qualitative approach does not tell anything about the importance of a specific barrier category. Overall, a quantitative study on the topic may provide an even better understanding. Another interesting subject for further study would be to understand the relationship and validity of the barriers with the following three elements of open or networked innovation: existing knowledge as innovation input, participatory innovation process of co-creation, and agreeing about the management of innovation output.

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