This paper was presented at The XXIV ISPIM Conference – Innovating in Global Markets: Challenges for Sustainable Growth in Helsinki, Finland on 16-19 June 2013. The publication is available to ISPIM members at www.ispim.org.

Finding the right partners for innovation networks

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Abstract: Despite recognition of the importance of careful partner selection for innovation networks, criteria that managers could apply in partner evaluation have gained scarce attention in research. A case study of five innovation processes in networks provided a rich data to explore the partner evaluation criteria that consider the peculiarities of open innovation. The findings suggest that partner selection criteria as discussed in current innovation literature are inadequate to capture the requirements of interactive collaboration. Instead, this study suggests that criteria based on capabilities provide more value when selecting partners for collaborative innovation. These characteristics can be divided into skills, attitudes and knowledge resources that enhance innovating in networks. This study contributes to open innovation and innovation network literature by showing how the capabilities that consist of a specific set of skills, attitudes and resources provide a suitable criteria for the partner selection in inter-organizational innovation networks.

Keywords: Partner selection; open innovation; innovation network; collaborative innovation; capabilities.

1 Introduction

Recent literature on open innovation emphasizes the role of inter-organizational networks in accessing resources, especially knowledge and technologies, for innovation (e.g. Almirall and Casadesus-Masanell, 2010; Bianchi *et al.*, 2011). Partner selection is a central question when forming a network of organizations for innovation. Extant literature states that the formation of network relationships influences the entire innovation process (Ring *et al.*, 2005) and the composition of an innovation network affects the direction of the innovation (Perks and Jeffery, 2006). Still, we know very little

on the criteria that firms should apply when establishing relationships for innovation networks. Although partner selection criteria have gained some attention in dyadic innovation relationships (e.g., Emden *et al.*, 2006; Feng *et al.*, 2010), research suggests that forming a network of relationships for innovation purposes is far more complicated (Ring *et al.*, 2005). Indeed, Huizingh (2011) identifies the need to extend our understanding on how to select the actors for collaboration. It would be important to the managers to know how to evaluate the potential innovation network members in order to ensure that the network is able to operate.

This paper addresses this gap in the literature by examining a central research question: *How can the focal firm identify suitable relationships for the innovation network*? Partner selection is considered especially in cases where innovation necessitates intense interaction between the network members. This is achieved by studying the innovation process in five innovation networks from the partner search until the commercialization of a technical service solution or package.

The major theoretical framing comes from the innovation networks literature (Pittaway *et al.*, 2004; Birkinshaw *et al.*, 2007) and collaborative innovation literature (Emden *et al.*, 2006; du Chatenier *et al.*, 2010). First, they provide complementary knowledge on relationship formation and on actors that are involved in collaborative innovation. Second, they discuss capabilities that are needed in forming and managing relationships for innovation.

This research contributes to open innovation and innovation networks literature by providing knowledge on partner selection in innovation networks where innovating takes place in intense collaboration between the network members. This paper provides knowledge on the attributes that the actors need to possess in order to be able to contribute to the innovation in networks.

The paper is organized as follows. The following section provides a review of the literature on partner selection in collaborative innovation. Next, the research design is presented. This is followed by the results that are derived from the five innovation projects in networks. The paper concludes with a general discussion about the theoretical and managerial implications of the study.

2 Literature review

Current research has paid attention to partner selection in innovation networks only in a general level or focused on other elements than selection criteria of specific partners. Academics have so far extensively researched the factors that affect behind partner selection in inter-organizational networks, such as dependence, uncertainty, need to learn from others (Beckman *et al.*, 2004), need to obtain resources (Pittaway *et al.*, 2004) or common interests (Doz *et al.*, 2000). Research has typically also focused on describing different organizations that might be included in an innovation network. Suppliers, customers, competitors and research institutions (Nieto and Santamaria, 2007; Huizingh, 2011) are most often mentioned as innovation partners. Large surveys have also examined who partners with whom for innovation (Tether, 2002; Arranz and Fdez. de Arroyabe, 2008). Innovation literature, however, often takes a dyadic perspective between the focal firm and each innovation partner even on the network level.

Characteristic is that existing business relationships and networks have attracted specific interest as sources of innovation relationships (Gulati, 1999; Birkinshaw *et al.*, 2007). Current research typically emphasizes trusted relationships that have been established over a long time-period (Möller and Halinen, 1999). Findings have indicated that new relationship establishment is so demanding that it should be handed over to intermediaries (Huizingh, 2011). Still, recent research indicates that firms tend to form relationships both with existing and new partners for innovation (e.g., Birkinshaw *et al.*, 2007; Story *et al.*, 2009).

Criteria on which firms select specific innovation partners have attracted limited research interest and research has taken place predominantly in dyadic partnerships. Current literature refers to complementary resources as a typical criterion for partner choice in innovation (King *et al.*, 2003; Miotti and Sachwald, 2003). Emden *et al.* (2006) found that firms value partners that provide technological synergy, have a compatible culture, show long-term orientation towards collaboration and are flexible in their actions. Feng *et al.* (2010) provide an evaluation hierarchy for R&D partner selection. They found that prospective partners are evaluated according to individual and collaborative attributes. Individual attributes include their technological and financial resources, knowledge and managerial experience as well as capability to access new

markets. Collaborative evaluation attributes consist of resource complementary, overlapping knowledge bases, motivation correspondence, goal correspondence and compatible cultures.

According to network perspective innovations emerge through novel resource combinations which requires intense interaction between the network members (Cantù *et al.*, 2012). Extant literature considers actor heterogeneity characteristic to innovation networks. Network members are found to differ in terms of values, role expectations, goals, languages, competences, cultures, practices and power. When the aim is, however, to innovate in intense collaboration among network organizations, they need to be able to work together in the same direction and reach the goals set to the network (Corsaro *et al.*, 2012). Thus features and capabilities that network members need to possess might help in identifying suitable partners for innovation networks.

Capabilities are understood here as an integrated set of knowledge, attitudes, and skills of an actor (du Chatenier *et al.*, 2010). Den Hertog *et al.*(2010) suggest that collaborative innovation calls for the capability to act and organize in open innovation systems. This includes the capability to co-produce and co-develop innovations with partners and other network actors and to orchestrate temporary networks. Orchestration aims at reinforcing togetherness and communication among the network members and ensuring equitable value distribution (Dhanaraj and Parkhe, 2006). Busquets (2010) suggests that orchestrating is the task of all network actors. Du Chatenier *et al.* (2010) further found that collaborative knowledge creation necessitates content management capabilities. Content management consists of a number of skills. Network actors need to exhibit good communication skills and reflective skills. They need to have professional experience and demonstrate critical but constructive thinking. Openness and conflict management skills are required when innovating in collaboration. Actors further need to commit themselves to common goals and win-win strategies.

Table 1 provides an overview on attributes that current literature discusses in connection with collaborative innovation relationships.

Table 1 Attributes connected to collaborative innovation relationships

Partner selection criteria in dyadic partnerships	*Capabilities needed in collaborative innovation*	*Skills needed in collaborative knowledge creation*
Individual attributes: Technological and financial resources Knowledge Managerial experience Capability to access new markets Flexibility	Capability to co-produce and co-develop innovations Capability to reinforce togetherness and communication Capability to ensure equitable value distribution	Communication skills Reflective skills Professional experience Critical and constructive thinking Openness Conflict management skills Commitment to common goals and win-win strategies
Collaborative attributes: Complementary resources Overlapping knowledge bases Technological synergy Compatible cultures Motivation correspondence Goal correspondence Long-term orientation		

3 Research design

3.1 Research strategy

This research employed a qualitative multi case study (Stake, 2008, 123) with five innovation projects that took place in networks. The qualitative case study research allowed studying both innovation processes and their outcomes (Silverman, 2006, 349) within a real-life context (Scholz and Tietje, 2002, 9; Yin, 2009, 2).

This study applied the instrumental case study approach where particular cases provided an insight into the research question with the aim of forming general understanding of the phenomenon (Stake, 1995, 3). Generalizations made in the study are analytical, based on finding similarities within studied cases (Dubois and Araujo, 2007). Multiple cases enabled building more robust, generalizable, and parsimonious theory (Eisenhardt and Graebner, 2007). In this research each case was chosen for theory-building reasons – that is, to illuminate the focal phenomenon and fill theoretical categories that enhance generalizability (Hallen and Eisenhardt, 2012). Therefore the study applied an abductive, theory development approach (Dubois and Gadde, 2002).

3.2 Empirical cases

The empirical cases dealt with the development of innovative technical business-to-business service solutions and service packages in inter-organizational but also inter-unit collaboration. Technical services were chosen for the study since they are typically delivered in cooperation with other goods and services providers and, as empirical research has shown, technical services firms are likely to engage in collaborative arrangements for innovation (Tether and Hipp, 2002). In addition, in the academic service literature, technical services have received scant attention (Schilling and Werr, 2009, 44).

The first case is about resource management system development at Alfa, a construction, maintenance and professional services provider. Alfa's aim was to be a pioneering and agile firm in its business field. This necessitated new kind of mindset in managing company resources. For this purpose Alfa decided to build a resource management system. With the help of the system Alfa wanted to develop and intensify the traditional way of performing work in the company. Six IT business solution firms formed a development network with the IT department of Alfa. The system was developed between 2008–2012.

Two cases deal with wind power service portfolio development, one at Alfa and the other at Delta, an engineering and consultancy firm. The peculiar characteristic of these cases is that they describe an emergent business field. Most of the actors were new in the field and many actors had been only lately founded. Actors thus often started searching other actors without any pre-information. Alfa developed a modular service portfolio for the entire life-cycle of a wind turbine both in intra-organizational team and with customers, suppliers, consultants and university students between 2008–2012. Delta's aim was to provide large engineering and consulting entities to the customers in the wind power field. Delta formed a development team inside the firm for this work in 2010. They hired also some consultants and university students for the development project. In 2012 Delta widened the cooperation to sister companies abroad.

The fourth case is about foundation solution development for wind turbine towers. The focal firm is a specialist of concrete connections and composite structures serving customers around the world. Apart from manufacturing, the firm invests heavily in R&D functions. It made a strategic decision to start development work in wind power business

in 2009. The representatives of the company had noticed that current wind turbine foundations could be substituted through a new foundation innovation that would be provided as a service concept to customers in wind power field. They found Delta and a system configurator firm to innovate and design the foundation with them. Later Alfa joined the project as a pilot customer.

The fifth case is about new automation solutions in mechanical engineering industry. A technical trading firm Gamma wanted to help their customers improve their competitiveness through a new innovation, a robotics solution. They concluded a partnership with a robotics firm in 2009 to develop the solution. The robotics solution was launched in 2011. During the development process they got an invitation to tender from a large engineering workshop that needed a large sample production solution. As the solution included various systems, Gamma and the robotics firm joined their forces with a laser-technology firm and a production systems firm to offer the new to the world system to the customer. The sample production solution was taken in use in spring 2013.

3.3 Data collection and analysis

This study used process research when studying the cases. Process research is defined as "research concerning a process that exists between two points in time…" (Quintens and Matthyssens, 2010). Thereby process research is able to describe how and why some temporally evolving phenomenon (Pettigrew, 1997; Bizzi and Langley, 2012) comes into being (Halinen *et al.*, 2012), develops and changes over time (Pettigrew, 1997). In this study, innovation processes were followed both retrospectively and in real time (Bizzi and Langley, 2012).

Qualitative interviewing was used as the primary data collection method (Warren, 2002). First round of interviews were conducted among the directors and project managers of the innovation projects in three focal firms Alfa, Delta and Gamma in January–September 2010. The second round of interviews were conducted among the directors and project managers of the three focal firms and firms that participated with them in the innovation networks. The second round of interviews took place in November 2011–December 2012 (see Table 1). Altogether 33 interviews were conducted in the five innovation projects. Interviews were audio recorded and transcribed verbatim.

Table 2 Interviews conducted in the companies collaborating for service innovation

Case	*Company*	*Position of the interviewee*	*Date of interview*	*Number of interviews per case Total n=33*
Resource management system	Construction, maintenance and professional services provider (Alfa)	Business development director/head project manager	15.2.2010 12.12.2011	
	IT business solutions firmA	Business area director	28.2.2012	
	IT business solutions firmB	Project manager	25.1.2012	
	IT business solutions firmC	Project manager	13.1.2012	
	IT business solutions firmD	Project manager	16.1.2012	6
Service portfolio for wind power industry at Alfa	Construction, maintenance and professional services provider (Alfa)	Business area director, wind power	19.2.2010 25.11.2011*) 11.12.2012*)	
	Alfa	Sales manager	4.9.2012	
	Engineering firm B	Divisional director	24.1.2012	
	Wind power producer	CEO	24.1.2012*)	6
Foundation solutions for wind turbine towers	Engineering firm A (Delta)	Project manager	20.9.2010*) 12.12.2011*)	
	Technology firm	Business development and technology director	30.1.2012	
	Construction, maintenance and professional services provider (Alfa)	Business area director, wind power	19.2.2010*) 25.11.2011*) 11.12.2012*)	6
Automation solutions for mechanical engineering industry	Technical trading firm (Gamma)	Group president CEO Business area director	11.2.2010 11.2.2010 20.8.2010 2.12.2011	
	Robotics systems firm	Senior Vice President	16.12.2011	
	Robotics systems firm	Project manager	3.12.2012	
	Laser technology firm (later production systems firm)	Divisional director	1.2.2012 13.12.2012	
	Production systems firm	Project manager	1.2.2012	9
Service portfolio for wind power industry at Delta	Engineering firm (Delta)	Unit director	30.1.2012	
	Delta	Team coordinator	1.2.2012	
	Delta	Project manager	20.9.2010*) 12.12.2011*)	
	Delta	Wind power specialist	3.9.2012	
	Wind power producer	CEO	24.1.2012*)	6

*) Same person interviewed for two projects in a single interview

The retrospective and real-time interviews with managers of various organizations that were directly involved in innovating projects, enabled the researcher to write down the innovation processes from the beginning into a point where the service solution or package was launched. This was followed by the cross-case data analysis. Preliminary research questions and the related literature provided the guidelines for data analysis

(Marshall and Rossman, 2006, 153, 156). The analysis began with an initial coding and categorization procedure with regard to the actors involved in service innovation projects and factors dealing with collaborative activities. Later the categorization was extended to include partner choice attributes and different ways in finding partners. These categories were compared with the categories that described different factors affecting collaboration during the innovation process. The complete data set was coded using NVivo10 qualitative data analysis software. The theory-building process occurred via recursive cycling among the case data, emerging theory, and extant literature (Eisenhardt and Graebner, 2007).

4 Findings

The case firms used to apply specific criteria to evaluate the potential partners and suppliers for innovating. The most applied criteria included references, organizational characteristics, complementary resources, joint interests and congruent targets for cooperation, level of commitment, and feeling of trust and good chemistry between the persons. When these criteria were reflected to the actual innovation process in the network, it was possible to evaluate their suitability in partner selection. Similarly, the study of the innovation process allowed to discover partner attributes that seemed to be relevant in innovation networks. The findings suggest that partner selection criteria applied by the case firms did not lead to interactive collaboration in the innovation networks. Instead, criteria based on capabilities seem to be suitable when selecting partners for collaborative innovation.

4.1 Findings on partner selection criteria set by the firms

The case firms could contact a potential innovation partner on the basis of its references. The head project manager of Alfa told how they got interested in the first principal partner of their resource management system project: "This firm sounded a promising partner then. They had another firm from our business field on their reference list." As each development project had, however, different composition of organizations and persons and different requirements, earlier project experience did not guarantee the success of an innovation project. The performance of an innovation network depended on all the members and how they could *act together*, *make decisions* and *manage the*

project. In the resource management system case, the principal partner was later changed because the project paralyzed as the customer's development team and the principal partner were not able to find common direction to the project.

Organizational characteristics played a significant role when the parties evaluated whether they could become development partners. One criterion was that the partners were not competitors in the given business field. The group president of Gamma noted: "The robotics firm is a strong actor in technology industry and we've nothing to do with it. That's why we won't face any potential competition." The results suggest that competitors should work in the same innovation network only if it will not reduce their willingness to collaboration and their *openness*. For example, the resource management system project faced difficulties as competing IT firms were afraid to communicate openly with each other.

Firm size was also regarded important in many cases when the firm sought for an innovation partner. A sales manager of Gamma described their experience of development cooperation with a large firm: "We tried to develop the robotics solution with one large firm. But it appeared to be impossible as they were too large. Other firms could act much faster." Instead of size, the results suggest that *agility* is substantial part of innovating.

Complementary resources between the partners enabled to develop a larger entity. But when the aim was to develop a technical solution or service package that required professional knowledge from a specific field, *complementary* resources were not sufficient. Resources needed to be also *homogeneous* enough so that the network members were able to innovate together. Parties needed to have a knowledge base that was close enough with other network members. For example, Delta's top management decided that wind power services would be innovated in a development team that consisted of representatives of different technical fields. It, however, materialized so that professional groups that consisted of members from the same technical field developed the services. The development team, instead, formed a large entity of the existing services and planned marketing and sales operations.

Joint interests belonged to the characteristics that the parties emphasized when thinking with whom to cooperate for innovation. Several informants brought up that the organizations should find each other in a natural way, so that both felt straight away that

they have common interests. The business area director of Alfa explained the reason why they and the fastening technology firm decided on cooperation in the wind turbine solution project: “They needed to find a firm where they could test their innovation. And then I happened to come and say that our existing foundation type is a bit old-fashioned, and if we could do together something about it. Of course they were immediately ready for it.” But the more actors a network had, the less likely this criterion could be applied. The empirical cases suggest that *commitment to joint actions* and willingness to strive for the *feeling of togetherness*, instead, clearly enhance collaboration in innovation networks.

Congruent targets were a clear driver for development cooperation. But even though partners had congruent targets, this did not alone lead to desired results. For example, the robot solution development took place as Gamma wanted to increase their machine and service sales and the robotics firm wanted to access the markets where Gamma was a well-known and trusted supplier. Still, they were not able to commercialize their solution because of the lack of adoption capability of the customers. Hence, the *skills to include the customer perspective* seems to be a more reliable predictor in collaborative innovation.

The level of commitment that the potential partner showed during the negotiations was one evaluation criterion. The CEO of Gamma found a clear expression of commitment by the partner a necessity before entering into development cooperation: “A partner may not be willing to invest so much in cooperation for some reason. We have to tell them ‘This is an important thing to us. And we need your commitment to it. You just tell us if you can’t make it, and we’ll search for another partner’.” The cases, however, revealed that commitment between partners comes about only when they have enough positive experience in working together. When the innovation projects faced serious problems, commitment of network members declined considerably. Instead, the *negotiation, problem-solving and reflective skills* as well as *skills to manage conflicts and risks* enhance the proceeding of innovation process.

As persons negotiated with each, chemistry and feeling of trust between them could play a significant role when deciding whom to cooperate with. The business area director of Alfa put it this way: “And when you get to know their people, you consider whether you have good chemistry.” Still, the cases showed that people changed constantly in the firms and in the development organizations. If personal chemistry was very much

emphasized, the change of a person could even lead to termination of a development relationship between the organizations. In addition, good chemistry did not necessarily mean that the persons were motivated or capable in innovation collaboration. The findings suggest that *good motivation* makes people commit to innovating. In addition to single persons, also the organizations behind them should have motivation to collaboration. This realizes in willingness to commit resources to innovation.

4.2 Attributes suitable in partner selection based on case experiences

The cases revealed that the criteria set by the focal firms on innovation relationships did not take into consideration a situation where the parties innovate interactively as a network. The empirical cases showed that an important attribute in development collaboration was *commitment to resources sharing* among the network actors. The project manager of one IT firm told about the problems they faced with other IT firms in the resource management project:

> "A good example was when one partner had made some changes in the program. We then needed a similar price list retrieval system for Alfa that this firm had already made. We wanted to copy it to the system. We told them that Alfa has ordered the retrieval system only once and they don't want to pay twice for it... But they answered me: 'No, we aren't going to give it to you. We've done this. It's ours.'"

Ability and willingness to *communicate* with other network members turned out to be one of the most important capabilities during the innovation process. The project manager of the principal IT partner in the resource management system project noted:

> "We ought to have discussed the things together. Like 'we have considered this kind of a solution. How do you find it? Could this succeed? Would it make something to your solution?' I missed such discussions."

If the network members lacked the ability to *negotiate* and *agree together on* their tasks, duties and roles in the project, it easily led to a situation where things had to be done in a less professional way or repeatedly. For example, the system integrator partner felt that they did not get their voice heard in the resource management system project. Their project manager described this as follows:

> "The principal partner did pretty much by themselves. They even largely determined how the integrations would function. Whereas our view was that we should have done things differently. And before we had the chance to say anything, things were decided already. We had no other possibility than to work according to those specifications. We had a couple of times discussions about our role in the project, and how we would like to do the things."

The project manager of one of the IT partners described the lack of joint agreement in the following way:

> "I do something here, you do there, and a third party does it somewhere else. Later we notice that we have either done quite the same thing or completely different things. However, the idea was to do things together."

The cases indicated that some actors did not strive for a *win-win situation* between the network members but used their power to reach their private goals. Alfa, for example, used their power to steer the direction of the software development at an IT firm. Alfa was a reference customer in their software development project. Alfa required that the software has to support first their wind power business that was the most actual to them. As a result the first version of the software did not support the needs of the typical customers of the IT firm. Their project manager noted:

> "A customer comes and wonders that we don't have a ready solution for factory maintenance, although we have developed the system for a long time already. That's a quite understandable reaction, but our focus has been elsewhere."

Innovation projects could be challenged also because of different ways of acting in the firms and variations in their working experience. As the network members were dependent on other parties, this caused conflicts between them. The senior vice president of the robot systems firm explained their challenges in collaboration with Gamma: "They are not used to carrying out projects. They've delivered only machines. (--) We've tried to guide them to do things in advance. This has been a surprise to them." Thus, when the network actors were not able to apply *similar working methods*, they could face serious problems.

5 Discussion

5.1 Theoretical implications and contribution

This study explored how the firms can identify suitable relationships for innovation networks. The findings allow to draw a profile of actors that most likely have the characteristics needed for collaborative innovation in networks. These characteristics can be divided into skills, attitudes and knowledge resources that enhance innovating in networks. They are presented in Table 3.

Table 3. Characteristics needed from members in innovating networks

Skills needed in innovation networks	*Attitudes needed in innovation networks*	*Knowledge resources needed in innovation networks*
Skills to act in a team Skills to manage large teams Skills to communicate Skills to negotiate and compromise Skills to make decisions Reflective skills Skills to manage conflicts and risks Problem-solving skills Skills to include the customer perspective	Good motivation Openness Agility Commitment to resource sharing Feeling of togetherness Commitment to joint actions Commitment to win-win strategy	Complementary but homogeneous knowledge base Experience on the applied working methods

The findings showed that the partner selection criteria may be more based on intuition than on knowledge in the firms. Similarly the partner selection criteria found in current literature (Emden *et al.*, 2006; Feng *et al.*, 2010) provided little use for collaborative innovating in a network. Instead capabilities – when understood as an integrated set of knowledge, attitudes and skills – that are needed in collaborative innovation (du Chatenier *et al.*, 2010) were found to provide a good basis for partner selection in innovation networks.

This study confirmed the results by du Chatenier *et al.*(2010) as similar skills and attitudes were found important in collaborative network relationships than in their research. But this study found a number of other skills and attitudes that have an influence on innovating in the network as shown in Table 3. The findings suggest that various team skills provide the basis for collaboration in a network. Further, network

actors need skills to include the customer perspective into the innovation process so that the new solution or service package has value to the customers. Besides various skills, network members need to show positive attitudes towards collaborative innovation. Good motivation, agility and commitment to various joint actions enhance innovating in a network.

Current research emphasizes complementary resources between partners in innovating (King *et al.*, 2003; Miotti and Sachwald, 2003). The findings of this research, however, suggest that when the target is to innovate in a specific knowledge field, knowledge resources need to be both complementary and homogeneous enough. This enables collaboration between the network members. In addition, actors should be familiar with the working methods that are applied in the innovating project.

This study contributes to open innovation and innovation network literature by showing how the capabilities that consist of a specific set of skills, attitudes and resources provide a suitable criteria for the member selection in inter-organizational innovation networks. The network perspective to innovation adds considerably to scant knowledge on partner selection in collaborative innovation.

5.2 Practical implications

For managers, this study highlights the importance of widening the perspective on partner choice in innovating. Criteria that managers may be used to applying when selecting partners might conceal more relevant criteria behind them. Managers should also consider the special requirements of collaborative innovating when deciding on partner selection criteria. Especially an inter-organizational innovation network necessitates skills and attitudes from the members that traditional partner selection criteria may not take into consideration. Managers are advised to pay attention to collaborative innovation process which consists of various parties, activities and resources which the innovation network jointly needs to manage. Besides single resource requirements, managers should thus take a network perspective to innovation when selecting partners.

We direct managers' attention to making use of their experience in collaborative innovation when considering the partner selection criteria in the following innovation projects. Especially positive and negative incidents during the innovation process provide

fertile knowledge for partner selection. And when evaluating the potential partners, managers may benefit from the knowledge whether potential partners have earlier experience in collaborative innovating. According to current literature the collaborative innovation skills can be learnt through experience (e.g., Gulati, 1999) which suggests that organizations that have participated in collaborative innovation might be better off in innovation networks. Potential partners with experience in collaborative innovation might be a good source of suitable selection criteria as well.

Managers are further advised to pay attention to knowledge resources that are needed in innovating. This study suggests that collaborative innovating does not benefit from heterogeneous knowledge bases when the aim is to innovate in a specific knowledge field. Still, complementary knowledge is found to enhance innovations (King *et al.*, 2003; Miotti and Sachwald, 2003). Heterogeneous knowledge bases might provide, however, benefits in other types of innovations (Corsaro *et al.*, 2012). In addition, managers should consider the working methods in the innovation project in advance and make sure that all partners are familiar with them.

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