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To cite this article: Helge Svare, Anne Haugen Gausdal & Guido Möllering (2019): The function of ability, benevolence, and integrity-based trust in innovation networks, *Industry and Innovation*, DOI: [10.1080/13662716.2019.1632695](https://doi.org/10.1080/13662716.2019.1632695)

To link to this article: <https://doi.org/10.1080/13662716.2019.1632695>



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Published online: 20 Jun 2019.



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The function of ability, benevolence, and integrity-based trust in innovation networks

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ABSTRACT

This study contributes to the understanding of how trust based on perceived ability, benevolence, and integrity functions in networks. It adopts a mixed-method approach with quantitative and qualitative data from five Norwegian innovation networks. The study demonstrates how trust based on perceived benevolence, ability, and integrity influences different aspects of network interaction and network outcomes against the background of the network members' perceptions of risk. Moreover, it finds that these dimensions of trust function differently at the inter-organisational and at the network level. The former level here concerns trust between the organisations in the network, while the latter concerns trust in the network more generally. Benevolence-based trust is identified as particularly salient at both levels for promoting open and honest communication as well as knowledge sharing, enabling both more successful collaboration in general, and more innovation specifically.

KEYWORDS

Network trust; inter-organisational trust; ability, benevolence, and integrity; network outcome; innovation

1. Introduction

Interfirm networks have become increasingly commonplace and increasingly collaborative (Sydow, Schüßler, and Müller-Seitz 2016). Firms enter networks for different reasons (Dyer and Singh 1998; Pittaway et al. 2004; Williamson 1991), motives being related to costs, risks, and benefits (Sydow, Schüßler, and Müller-Seitz 2016). Some networks are also dedicated to innovation. Firms enter these *innovation networks* to gain access to knowledge or ideas that may help them innovate or to find innovation partners such as universities and R&D-organisations (Fichter 2009; de Jong and Hulsink 2012; Pittaway et al. 2004).

Trust is generally acknowledged to be conducive to successful network performance (e.g. Delbufalo 2012; Gulati and Nickerson 2008; Zaheer, McEvily, and Perrone 1998), even if other factors are also significant (Gausdal, Svare, and Möllering 2016). Although studies of trust in networks do exist, there have been many calls for further studies in

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this field of research (Child 2001; Delbufalo 2012; Provan, Fish, and Sydow 2007; Seppänen, Blomqvist, and Sundqvist 2007).

This study responds to these calls by addressing a problematic trend in earlier research on trust in networks, where trust is seen as a broad phenomenon without considering its multidimensionality, and without considering how the various dimensions of trust may function differently in various network contexts. More specifically, this paper aims to contribute to a more nuanced understanding of how trust functions in networks, by establishing a theoretical framework where trust is explored in relation to specific risks that present itself in different network activities, and at different levels. It does this by using Mayer, Davis, and Schoorman's (1995) model of trust based on three forms of trustworthiness: ability, benevolence, and integrity (ABI) (cf. also Schoorman, Mayer, and Davis 2007). The ABI model was originally developed to address interpersonal relationships within organisations. In this study, the model is applied at both the network's inter-organisational level and at the network level. At the former level, we find *inter-organisational trust*, which refers to the trust between individual organisations within a network. At the latter level, we find *network trust*, which we define as the way network members trust the network in general. At both levels, a distinction is made between trust based on ability, benevolence, and integrity.

Trust is defined as 'the willingness of a party to be vulnerable to the actions of another party'; when trust is present, it may be observed in the form of risk-taking behaviour (Mayer, Davis, and Schoorman 1995, 712). Lower degrees of trust, therefore, typically correspond with less risk-taking behaviour, and may result in a reduced level of involvement in the activity that the trustor perceives to be risky. In an innovation network, this implies that lower degrees of trust may lead to reduced involvement in essential network activities relative to the risk that network members perceive to be entailed. Correspondingly, higher degrees of trust should be expected to strengthen involvement in spite of these perceived risks. However, in order to understand these dynamics in more detail, according to the ABI-model, we need to understand not only how specific risks influence these dynamics, but also how trust based on perceived ability, benevolence and integrity functions in response to each of the risks. Moreover, if we assume that there is a connection between these trust dynamics and how the network performs or what outcome it produces, this would help us understand variation in this respect, for instance related to knowledge sharing which is essential to innovation. These considerations lead to the following research questions:

- (1) What are the specific risks that network members perceive relative to involvement in their network, and how do these risks influence their level of network involvement?
- (2) How does trust based on perceived ability, benevolence and integrity promote involvement despite the perceived risks, and how does this influence network performance and outcome in the form of knowledge sharing and innovation?

To answer these questions, an empirical study with qualitative and quantitative data from five Norwegian innovation networks has been conducted.

2. Literature review and theoretical framework

Networks constitute complex social systems in that their members have different cultures, histories, belief systems, logics, and interests (Sydow, Schüßler, and Müller-Seitz 2016). Also, they are loosely coupled systems, and even when a network has central management, this management has typically limited formal authority over the network members. Member participation depends on voluntary participation, which makes trust a critical factor (Delbufalo 2012). However, high levels of trust alone do not motivate network participation. The decisive factor for a firm deciding whether to join a network or whether to remain a member is the expectation that participation will contribute to valuable outcomes. Moreover, networks may disintegrate even when trust is high, for instance when such expectations are disappointed (Gausdal, Svare, and Möllering 2016).

Trust may still have a strong impact on decisions to join or leave networks or network activities and is a relevant factor in light of the risks involved in these activities, as perceived by the participants. The higher the risk participants perceive in network activity, the stronger is the probability that they will participate with lower engagement or avoid involvement altogether, other things being equal. Trust helps to counteract the resulting inertia, engendering instead the willingness to get involved despite the risk (Mayer, Davis, and Schoorman 1995). The connection between risk, trust and involvement is therefore central to this study.

Few studies address network trust in the way the concept is being defined in this study, i.e. not only as the dyadic inter-organisational trust between specific network members but also as the trust that the network members have in their network *in general*. For the sake of simplicity, we will in the rest of this article refer to the former as *inter-organisational trust* and the latter as *network trust*. At the inter-organisational level trust has been found to facilitate a higher quality of communication and collaboration among network members (Squire, Cousins, and Brown 2009), as well as to reduce the need for information protection mechanisms (Cheng, Yeh, and Chia-Wen 2008). In a comprehensive literature review, Delbufalo (2012) identified a positive and strong effect of inter-organisational trust on joint action and joint problem-solving. Inter-organisational trust has also been found to reduce inter-organisational conflicts (Gulati and Nickerson 2008; Seppänen, Blomqvist, and Sundqvist 2007; Zaheer, McEvily, and Perrone 1998). To our knowledge, however, no studies address the trust that the network members have in their network *in general*, and how variation in this trust influences network involvement or network outcomes.

A key explanation for variation in trust involves referring to how a trustor perceives the trustworthiness of a trustee (see, e.g. Colquitt, Scott, and LePine 2007), which according to Mayer, Davis, and Schoorman (1995) may be understood as being based on the perceived ability, benevolence, and integrity (ABI) of the trustee. This distinction constitutes a significant part of the theoretical framework of the present study. Since Mayer, Davis, and Schoorman's ABI-model was originally developed to analyze trust at the inter-personal level, its relevance to the network's inter-organisational level and the more general network level requires a separate discussion. Even if we may assume that interpersonal trust influences higher levels of trust, and vice versa, the levels should not be confounded (Fulmer and Gelfand 2012).

McEvily and Zaheer (2006, 2) define inter-organisational trust as ‘the collectively-held trust orientation by members of one organization toward another organization’, and emphasise that even if one assumes that in these organisations trust originates from the individuals in them, the resulting inter-organisational trust differs in its being directed not at an individual, but at the organisation as a whole. In discussing the antecedents of trust at the personal and organisational level, Fulmer and Gelfand (2012) conclude that it remains unclear whether these antecedents are unique to one level of analysis or applicable across levels. Research on the outcomes of trust, however, seems to support their first alternative: For instance, inter-organisational trust – albeit not interpersonal trust – has been found to explain variation in supplier performance within buyer-supplier dyads, where both sides of the dyad are organisations (Zaheer, McEvily, and Perrone 1998). Inter-organisational trust has also been found to be more important for the success of supply chain relationships than interpersonal trust (Fawcett, Magnan, and Williams 2004).

Based on the need to distinguish between levels, an account of how the ABI-framework may be applied at the network’s inter-organisational level and at the more general network level will now be presented. Ability is defined as the ‘group of skills, competencies and characteristics that enable a party to have influence within some specific domain’ (Mayer, Davis, and Schoorman 1995, 717). A person or an organisation may have a higher ability in one domain or related to specific tasks, while lower ability relative to others. At the network’s inter-organisational level, we take the concept of ability to refer to the group of skills, competencies and characteristics that enable an organisation to exert influence within some specific domain. Moreover, we posit that the way in which an organisation perceives another organisation’s ability will influence the trust it places in it, in cases where such ability is relevant. For instance, if a firm needs the services of a research institution during a product development process, it will trust the research institution less if it perceives that the research conducted is generally low-quality. At the general network level, we take the concept of ability to refer to how the member organisations of a network *in general* are perceived by its members as regards skills, competencies, and other characteristics that may be of relevance to them. Further, we propose that these members will trust their network to a higher or lower degree (i.e., have network trust), depending on how they perceive this network ability.

Benevolence is defined by Mayer, Davis, and Schoorman (1995, 118) as ‘the extent to which a trustee is believed to want to do good to the trustor, aside from an egoistic profit motive’. A benevolent organisation is an organisation which has not only its own interests in mind but is able to align this interest with an intention to do well to other organisations. Alternatively, we may define organisational benevolence indirectly, through the concept of opportunism. High levels of opportunism correspond to low levels of benevolence, with a subsequent negative impact on the trust received, in cases where such benevolence is relevant. At the network level, we take the concept of benevolence to refer to how the member organisations of a network *in general* are perceived by its members as regards their intention to do good to them. We propose that the members will trust the network to a higher or lower degree, depending on how they perceive this network benevolence.

Mayer, Davis, and Schoorman (1995, 719–20) define integrity as ‘the trustor’s perception that the trustee adheres to a set of principles that the trustor finds

acceptable' along with 'the consistency of the party's past actions, credible communications about the trustee from other parties, belief that the trustee has a strong sense of justice, and the extent to which the party's actions are congruent with his or her words'. Our notion of inter-organisational integrity emphasises the latter part of the definition, i.e., a strong sense of justice, as well as congruence between actions and words. An organisation is perceived to have integrity when it honours previously established agreements by acting in accordance with them and acts according to established norms of justice. The notion of network integrity may be designed in a process corresponding to the design of the notion of network ability and network benevolence, as demonstrated above.

Despite the fact that Mayer, Davis, and Schoorman's ABI model has gained considerable acceptance (Baer and Colquitt 2018), the number of studies where the model has been applied to inter-organisational relations is still relatively limited (Connelly et al. 2018). This consideration proves even more true when we look for studies addressing specifically innovation networks, as well as studies examining the dynamics between risk, trust, and involvement in such networks.

In light of this, let us start by looking at some earlier uses of the ABI-model in *other* contexts. Fulmer and Gelfand (2012) have reviewed literature using the ABI-framework to examine trust in individual organisations. Low ability in an organisation (i.e. malfunctioning products) may reduce consumer trust (Lin et al. 2011), while benevolence (i.e. positive employee-organisation relationships in the form of supervisor support) may relate positively to employees' trust in their organisation (Zhang et al. 2008). Due to their different focus, however, these findings do not necessarily transfer to the inter-organisational or network levels as defined in this study.

Another stream of research focuses more directly on the inter-organisational level, exploring the significance of ABI for trust and other outcomes, even though the specific ABI-terminology is not always used. For instance, instead of ability-based trust, we may find the notion of competence-based trust (e.g. in Lui and Ngo 2004). Still, in a review of this literature, McEvily and Zaheer (2006) report fairly consistent findings for the relationship between these ABI dimensions of trust and performance in inter-organisational collaborations. In a more recent study, Connelly et al. (2018) found that integrity-based trust is more potent for reducing transaction costs between organisations than is competence-based trust. Further, Pollack, Barr, and Hanson (2017), discussing on a theoretical level strategic alliance building between entrepreneurs and stakeholders where no previous relations exist, argued that perceived ability and integrity should be expected to play a more prominent role than benevolence at an early stage of the alliance building, while benevolence should be expected to grow more significant over time.

Concerning the relation between trust and innovation, research has found, at a general level, that knowledge sharing is the main driver of innovation (Jensen et al. 2007; Toedting, Asheim, and Boschma 2013). As trust is conducive to such sharing (Maurer 2010; Miles, Miles, and Snow 2005), trust may explain variation in innovation in and between innovation networks (Delbufalo 2012; Gausdal, Svare, and Möllering 2016). The fact that innovation typically requires collaboration, which may also involve a variety of risks, gives additional support to the idea that trust may explain variation in

innovation in and between innovation networks (Fitjar and Rodríguez-Pose 2013; Hardwick, Anderson, and Cruickshank 2013; Stamm 2004).

Little previous research exists regarding which risks and trust dimensions are more relevant in the context of innovation more specifically. A significant exception is found in a study of Shazi, Gillespie, and Steen (2015) studying innovation teams in enterprises. Trust is salient for innovation in such teams, they argue, due to the risks and uncertainties inherent in creating and implementing novel ideas. Uncertainties and risks are connected to opportunistic behaviour, failure of technology, unforeseen organisational hurdles and financial concerns. Trust allows actors to share information and collectively solve problems to manage these risks (Shazi, Gillespie, and Steen 2015, 83). Moreover, they found that the ABI dimensions of trust had different functions in different phases of the team's work, corresponding to the specific risks present in each of these phases. For instance, they found that in the tie formation phase, in which team members form temporary project groups, ability is a central factor, since low ability entails a risk that a project will not succeed. Later, when teams have been formed, risks emerge relative to the disclosing, discussing and refining of ideas that are essential to innovation. Risks include the possibility of low-quality idea development, theft of ideas, or ideas being ridiculed. Perceptions of competent actors here resulted in a reduction of the perceived risk for low-quality idea development, while perceptions of benevolent actors resulted in a reduction of the perceived risk of being ridiculed.

Finally, Shazi, Gillespie, and Steen (2015) found a conditional structure as to the order in which these trust dimensions became relevant. For instance, ability only significantly influenced tie formation when the trustee was perceived to have a sufficient level of benevolence and integrity. When this was not the case, ability was no longer a relevant criterion for partner selection (Shazi, Gillespie, and Steen 2015, 87). This does not mean that benevolence or integrity alone motivates tie formation: ability is still essential, but only after a sufficient level of benevolence and integrity has been ascertained.

In the trust literature, more than one concept has been introduced to describe the relation between trust and connected activity. One is to ascribe trust the status of an *entry condition*, i.e., trust needs to be present above a certain threshold level in order to counteract the negative effect of a perceived risk, so that an activity is carried out. Alternatively, trust may be conceptualised as a performance facilitator, for instance in enhancing network performance along a scale from zero to optimal level, with higher levels of trust corresponding to higher-quality performance (Chang and Lee 2013; Hsu and Chang 2014).

A potential problem with the notion of entry condition is that it implies a temporal structure of successive events. In the present context, we believe that the more general concept of a *condition* gives a better description of the situation. For instance, when Shazi, Gillespie, and Steen (2015) argue that ability-based trust significantly influences tie formation only when there is a sufficient level of trust based on benevolence and integrity, there is no *necessary* temporal relation between the three trust forms, or the sequence in which they are perceived, even if a temporal sequence may be found in specific cases. The relation is better described as conditional, i.e., a sufficient level of the two latter trust forms is a condition for the relevance of ability.

Even if Shazi, Gillespie, and Steen (2015) study interpersonal trust, and not inter-organisational trust or network trust, their theoretical framework supports the one we develop in the present study. This theoretical framework consists of several

propositions. A first proposition is that, in order to understand how trust influences network performance and output in innovation networks, at the network level and at the inter-organisational level within the network, we need to distinguish between different activities, and for each activity we need to explore how those involved perceive it to be associated with risk. A second proposition is that the perceived risks have the potential to reduce the level of involvement in the associated activities, or to cause the participants to withdraw from them altogether, as they will seek to avoid the potentially negative effects. A third proposition is that trust based on ability, integrity and benevolence have the potential to counteract the resulting inertia, albeit not in the same way: Each of these trust dimensions may have a higher relevance to some risks, and lower to others, dependent on the context. A final proposition is that there may be a conditional relationship between the trust dimensions relative to specific risks, so that the relevance of one trust dimension depends on some of the others.

The notion of a trust dimension refers to Mayer, Davis, and Schoorman (1995) three forms of trustworthiness, each corresponding to a trust dimension; trust based on perceived ability, integrity and benevolence, respectively. Methodologically, we assume that whenever such a form of perceived trustworthiness is observed, the corresponding trust dimension is also present, which implies that perceived trustworthiness functions as a proxy for trust.

3. Data and methodology

Five Norwegian regional innovation networks, established to improve the innovation performance of their members, constitute the empirical field for our study. Each of these networks organise firms pertaining to either one single industry or to a set of related industries. According to data collected by Statistics Norway, the members are mostly small or medium-sized firms. The networks and sample qualities for the conducted survey are presented in Table 1.

A mixed method design (Creswell 2014) with semi-structured interviews and a survey was selected. Data was collected in Norwegian; the findings have been translated into English by the authors.

3.1. Interviews

The interviews with a stratified sample of 20 key informant network member firms were performed from September 2016 to June 2017, by one or two researchers. All but three

Table 1. Network and sample characteristics.

Network	Founded	No of members 1.6.15	No of core members 1.6.15	No of responses	Response rate %	% of total sample
Network 1	2007	70	52	27	52	20
Network 2	1998	46	43	20	47	15
Network 3	2009	179	124	62	50	47
Network 4	2006	60	43	13	30	10
Network 5	2009	20	20	11	55	8
Total sample		375	282	133	47	100

Source: The authors

interviews were performed face-to-face, two by telephone, and one by Skype. Fourteen informants were CEOs or managing directors, the other six were: one sales manager, one product manager, one director for business development, one HR manager and two network leaders. Because of the male dominance typical of the industries involved, only three informants were female, while the remaining 17 were male.

The semi-structured interviews were based on an interview guide. Inspired by Münscher and Kühlmann (2012), it emphasised critical incidents, which in our case are defined as situations representing risk or vulnerability for the informant, either associated with his/her firm's involvement at the network level or at the inter-organisational level within the network. Moreover, we specifically asked for examples of risks associated with low levels of each of the three trust dimensions. Follow-up questions were introduced to explore the potential consequences of high risk and various levels of trust in each of the cases presented.

The interviews were fully transcribed. The passages relevant to the research questions were organised into an analyzing table. The table had one column for each interview question and one row for each informant. The selected transcripts were subsequently coded into categories, first deductively, then inductively (Miles, Huberman, and Saldaña 2014). The deductive codes were the three dimensions of trustworthiness – ability, benevolence and integrity – at the two levels being studied (inter-organisational and network). The inductive codes were constructed from the different types of perceived risk that were being identified, and again at the two levels. To this was added how the different dimensions of trust promoted involvement despite these risks, and the outcome produced. The aim of this part of the analysis was to generate a comprehensive and detailed understanding of the dynamics between risk, trust, involvement and outcome as reflected in the narrative accounts of the informants.

3.2. Survey

However, such an understanding based on the narrative accounts of the interviewees does not say much about the representativeness of the findings within the networks, nor how variables correlate more systematically. To shed some light on the latter point, we collected and analyzed survey data.

The survey encompasses firms operating within the industry(ies) specific to each of the five networks, i.e., their core firms. Non-core firms, for instance generic service providers, and non-firm members such as universities, NPOs and NGOs, were excluded from the survey. The survey was distributed to the main network contacts: typically, the manager for the smaller firms, while for the larger firms, it could also be an employee with the role of managing the contact between the network and the firm. The survey was distributed in June 2015 to 282 firms, and obtained a response rate of 47%. By manually comparing the responding firms to the distribution list, we were not able to discover any non-response bias.

Three dimensions of network trust were measured by the following question: 'To what degree do you think that the following statements fit as descriptions of the other network members?': 1) They act honestly and upright, 2) They are capable and competent within their fields, 3) They are more concerned with their own interests than with the interest of others. The three trust dimensions were measured by using the three forms of trustworthiness of the ABI-model as proxies. The first variable measures

integrity, the second ability, and the third reverse-measures benevolence. The formulation measuring integrity is based on the last part of Mayer, Davis, and Schoorman's definition, emphasising a sense of justice as the main principle of integrity. We chose to formulate the statement in an oral, informal everyday language ('honestly and upright'), to tap into the respondents' everyday notion of integrity.

Four output variables were measured by the following four questions: 'To what degree has the network resulted in any of the following outcomes?': 1) Better access to new knowledge, technology and R&D, 2) More systematic innovation efforts within the firm, 3) More collaboration related to innovation, 4) Innovations that would not have occurred without the network. The first variable serves as a proxy for measuring knowledge sharing, while the remaining three measure various aspects of innovation. As inter-organisational trust has been found to reduce inter-organisational conflicts (Gulati and Nickerson 2008; Zaheer, McEvily, and Perrone 1998), we also added a variable measuring network conflict leading to reduced levels of network outcomes. The latter was based on the question 'To what extent has there been conflict in the network resulting in reduced network output?' Responses were in all cases recorded with a 5-point Likert scale where 1 = to a very low degree, 3 = to a moderate degree, and 5 = to a very high degree.

To explore the relation between the three dimensions of trust and the four output variables as well as the conflict variable, an ordinary least squares (OLS) regression analysis was carried out. To ensure a sufficient sample size, the regression was carried out on the total sample of respondents. As there may be differences in how trust functions in the various networks, a dummy variable representing the networks that the respondents belonged to was added as a control in the regressions. This design yields no basis for comparing the networks, however, the regressions provide meaningful insights on how the variables correlate within the total sample. The OLS model thus takes on the following form:

$$Y_i = \alpha + \beta TW_{1-3} + \gamma_2 \text{Controls}_i + \epsilon_i,$$

where Y refers to the independent variables, β is the coefficient for the TW_{1-3} variable representing the three perceived trustworthiness variables functioning as proxies for their corresponding trust dimensions, and ϵ depicts the error term.

4. Findings

4.1. Interviews

4.1.1. Network level

When asked about their networks *in general*, and the perceived risk in involving themselves in network activities, the interviewees reported low levels of risk. Overall, they reported having high trust in their networks, along all the three dimensions of trust.

References to risks mostly came up indirectly, in counter-factual arguments. For instance, when asked whether they experienced risk associated with low integrity at the network level, they generally denied this, maintaining that the opposite was the case: 'We have shared business secrets for many years, and yet we have not been exposed to anything bad.' Still, they also maintained that had integrity been low, this would have

radically and immediately undermined the existence of the network. When asked to think of possible examples of low integrity, they mentioned, for instance, not keeping one's word, or not treating the information shared at meetings as confidential, when such confidentiality had been demanded.

As with integrity, few informants reported any actually perceived risks related to low ability at the network level: on the contrary, network ability was perceived to be generally high, and a major driver of their motivation to participate in the network. It was, for instance, of great use when they needed professional help or counsel, for gaining access to innovation-relevant information, or when they were seeking high-quality partners for temporary projects. Nevertheless, when emphasising these points, they also hinted at the potential risk entailed if network ability had not been that high. This risk has to do with time being a scarce resource, and the necessity of investing it in activities that yield a return. Relevant forms of return are for instance finding competent collaboration partners, or information that is useful in an innovation process. Too low return on the time invested is perceived to involve a risk in the sense that it detracts time from other profitable activities, which in the long run could generate an accumulated disadvantage. One interviewee said that they had reduced their involvement in their network after finding out that few other members had the competence they needed. The interviewee also emphasised how his/her firm had become gradually more strategic in this respect: instead of just participating in existing networks, they had begun to target specific firms, R&D-institutions, and individuals that they found had a relevant competence; in a sense, they were in the process of building a new network better tailored to their needs.

A further potential risk associated with low network ability had to do with reputation. According to the informants, high network ability leveraged their professional standing, as the reputation that their network's ability produced publicly reflected back on each individual member. As one informant stated: 'You may get a bad stigma if you are part of a network that is not working. Obviously, if you have a network with low levels of expertise, you will not attract good people.' The result would again be reduced involvement in the network to limit the loss.

When asked to think about the risk following low levels of benevolence at the network level, the potential for receiving professional help or counsel was mentioned again, as high levels of benevolence were associated with a higher readiness for offering assistance. The informants also generally evaluated the network benevolence in their networks as high. Indeed, the high levels of benevolence observed as a willingness to help or share valuable knowledge or information, may strike network newcomers as extraordinary, as another informant remarks: 'I see that it may be strange for new network participants to share as much as we do.' Nevertheless, some informants remarked that, even if they perceived the benevolence in the network to be high, they also suspected that it might be superficial, for instance in the sense that if some crisis had emerged, the network might not have survived. Nonetheless, one informant comments: 'If benevolence was lacking, we would not share anything.'

In conclusion, the informants saw potential risks associated with both low network ability, benevolence and integrity. Among these, the risk associated with low network integrity appeared to be more critical: If one could not trust the others to keep their words, the network would be impossible. The risk associated with low ability was

moderately less critical, as it would not lead to the immediate demise of the network, even if it might threaten its survival over time, making it less interesting to participate. The risk associated with low benevolence was associated with lower levels of reciprocal help and knowledge sharing, which – should benevolence become too low – would also undermine the motivation to be involved in the network.

4.1.2. Inter-organisational level

When the informants were asked about perceived risk at the inter-organisational level in the networks, the examples that came up typically had to do with collaboration between two or more network members. These were of two main types: On the one hand, there were R&D collaborations where the intended outcome was an innovation. On the other hand, there were collaborations between network member firms in the role of suppliers working for a joint delivery to a major customer. Because most of the network members are SMEs, collaboration between suppliers is common, and, so to speak, part of the normal routines under which these firms operate. Also, due to the fact that each new project may need a specific combination of skills and competencies, firms repeatedly find themselves in a situation where they have to assess the trustworthiness of potential partners with whom they have no previous relation at this level of collaboration.

In the initial phase leading up to such collaboration, i.e., when the firms scan their environment in search of relevant partners, perceived ability was emphasised as essential. To consider a firm as a potential partner, its ability needs to be both sufficiently high and relevant to the specific delivery. The perceived risk if a partner's ability does not match these criteria, is that the delivery will fail, or that it will be of low quality, in which case the future relation with the customer would suffer, or – worse – the customer might take action for damages that could result in economic loss. A further consequence might be a loss of reputation in the broader community, resulting in reduced chances for future contracts. To build sufficient trust to overcome these risks, firms tend to collect as much information as possible on the potential partners' ability, before they approach them. Sometimes, such knowledge is part of the firms' general industry knowledge; in other cases, firms initiate an extensive investigation by searching websites, or assessing other publicly available information. As one informant said: 'We check: Have they been in business long? Have they delivered interesting products? Have they organized themselves properly?' Being member of a network is also helpful in this respect. The network may function both as a pool for potential partners, and as an information pool where one may find information on such partners. Another informant argued: 'My formal network contains many skilled people [...]. I first look through that group [for potential partners] before I go on a broader search. If not, I can ask them [network members] to look into other networks that they have access to.'

Benevolence is mentioned mainly regarding the collaborative phase itself, as conducive to open communication. For instance, it is easier to ask 'stupid questions' when the other partner is perceived as benevolent. When this is not the case, there is the risk that such questions may provoke irritation, perhaps in combination with sanctions aiming at preventing further questions. Benevolence counteracts the risk of such outcomes, engendering a more generous, helpful attitude towards the other.

When asked to give examples of the perceived risks associated with low integrity in inter-organisational collaborations, the informants frequently referred to the

significance of delivery on time, i.e., that partners are loyal to previous agreed deadlines, and also to agreements more generally. Describing a collaboration that is successful in this respect, one informant says:

One does what one promises to do, what we have decided, and is loyal to common decisions. [...] If we set a date for a delivery, we do not need to remind them, it's just there ... It's as valuable as gold.

The risk involved if a partner fails in this respect is roughly the same as above: delivery failure, relational breakdown, loss of reputation, reduced profit and economic loss. Alternatively, the risk is that one will have to compensate for the other's failure, by doing more of the job oneself, which may result in stress and reduced quality and profit.

Another integrity-related risk is misuse of shared knowledge, as one informant claimed:

'They [potential collaboration partners] have to be honest, and not steal ideas or deceive us, but stick to their business.'

Assessment of a potential partner's integrity is typically made before this potential partner is approached, based for instance on reputation. One informant said: 'I get plenty of useful hints [on the integrity of potential collaboration partners] from people I know.' Another gives the example of a person running a one-person firm who is known to arrive late at assignments. The informant reflects that, regardless of how skilled such a person is, hiring him is a great risk: 'There is no point in [hiring] the world's best photographer if he is four hours late.' To the extent that such integrity challenges are publicly known, they also influence the partner's selection phase. Evaluation of a firm's trustworthiness based on its integrity may also be based on earlier experience. One informant, for instance, emphasises how he prefers to use a group of suppliers in his hometown, even if they are more expensive, because, in his experience, they always deliver on time, in contrast to similar suppliers in an East-Asian country.

The informants, moreover, notice that perceptions of integrity often develop over time, during a collaboration process, as it becomes clear whether a partner honours established agreements or not. In the cases where agreements are honoured, trust based on perceived integrity grows stronger. The opposite, obviously, happens if a partner does not demonstrate the required integrity.

In conclusion, the informants saw potential risk in low ability and low integrity, and these trust dimensions were particularly relevant in the phase where partners were being evaluated as potential collaboration partners. Low levels of the associated trust dimensions make a firm less motivated to initiate a collaboration with another firm. Low benevolence, and its associated trust dimension, reduce the communication within a collaboration.

4.2. Survey

Table 2 presents the descriptive statistics for the three dimensions of trust.

Table 3 presents the regression results. VIF tests were conducted, with no multicollinearity problems detected. The first number in each row denotes the coefficient, followed by the standard error in the parenthesis, and the standardised coefficient. R2 is

Table 2. Descriptive statistics of the three dimensions of trust.

	Mean	N	SD	Minimum	Maximum
Ability	4.34	118	.630	3	5
Benevolence	3.01	118	1.050	1	5
Integrity	4.36	118	.636	2	5

Source: Own survey

Table 3. OLS estimation of the empirical model – three dimensions of trustworthiness.

	Knowledge sharing	Increased innovation efforts	More innovation-collaboration	Network-dependent innovation	Conflict
Integrity	.88(.67).18	.16(.66).03	-.17(.73)-.03	-1.17(0.84)-.20	-0.90(0.38)-0.34**
Ability	-.06(.25)-.03	.03(.25).02	.36(.27).18	0.77(0.32)0.34	0.04(0.14)0.04
Benevolence	.25(.11).22**	.39(.10).35***	.41(.11).33***	.35(.13).26***	-0.03(0.06)-0.05
NW_d1	.55(.31).17*	.65(.31).20**	.57(.34).16*	.73(.39).18***	0.26(0.18)0.14
NW_d2	-.74(.36)-.19**	-.82(.36)-.21**	-.80(.40)-.18**	-.67(.45)-.14**	-0.01(0.21)0.00
NW_d3	-.28(.28)-.10	-.40(.28)-.14	.04(.31).01	.30(.35).09	0.39(0.16)0.24**
NW_d4	.12(.40).03	.03(.39).01	-.22(.43)-.05	.24(.49).05	0.41(0.22)0.17*
Constant	3.55(1.85)*	1.25(1.81)	-.16(2.00)	-3.53(2.30)	-.08(1.04)
R2	.13***	.19***	.17***	.14***	.15***
N	118–133	118–133	118–133	118–133	118–133

*P < 0.10. **P < 0.05. ***P < 0.01.

Source: Own survey

the adjusted R square. Although the regressions were run on the sample as a whole, the network dummy variables (NW_d 1-4) act as a control for network-specific variation.

Benevolence stands out as the decisive dimension of trustworthiness relative to all the three dependent variables measuring innovation, as well as for the variable measuring knowledge sharing. As for the conflict variable, integrity stands out as the essential variable: Reduced network benefits following conflict are significantly negatively correlated with reduced levels of integrity.

5. Discussion and conclusion

The first research question has been: *What are the specific risks that network members perceive relative to involvement in their network, and how do these risks influence their level of network involvement?*

At the network level, two perceived risks appear to be particularly salient. The first has to do with time being a valuable and scarce resource. This is especially true for the smaller firms, where a limited number of employees have to run both the day-to-day business activities, and the longer-term innovation processes needed for securing the firms' future competitive advantage.

When firms join an innovation network, a significant intended return comes in the form of gaining access to strategically significant information relating to innovation.

Return on time invested, then, depends on the extent to which the network is able to supply such access, which in turn depends on its ability. Lower levels of perceived network ability, thus, correspond to a higher perceived risk of low return on invested time, which may lead to reduced network involvement, or outright withdrawal.

The second perceived risk relates to the potential cost associated with the sharing of information in the network. Information may represent a potential competitive advantage, for instance as a starting point for an innovation that may generate high profit. Should such information reach a competitor, and should this competitor use it opportunistically to gain a competitive advantage, disregarding the interests of the original information-holder firm, it could cause a considerable loss. Sharing information may also entail a risk in another way: If a firm discloses negative information about itself and this is being spread by other network members it may affect negatively both its market position and its status as a potential partner. High perceived risk in this respect may again result in less information sharing, especially of strategically significant information.

Additionally, it may be worth noticing that there is a relationship between the risks that have now been identified: If the risk associated with information sharing leads to lower levels of such sharing, the risk that network members will experience low return on invested time will increase, as a further consequence. Moreover, the latter risk may reach critical levels, even if the perceived network ability as such is high: There is little use in the network being a potential source of strategic information if the information is not shared.

At the *inter-organizational level*, perceived ability and perceived integrity seem to be essential when partners are sought out for collaboration. Low levels of both entail high risk. Low ability in a partner may for instance spill over in low quality in project delivery, threatening the firm's reputation and market position; low integrity, such as when a partner does not fulfil its obligation in a project, may produce the same negative outcome. This means that low ability-based trust and low integrity-based trust both discourage partnership selection. The most frequently mentioned risk in connection with low benevolence is found after a collaboration has been established: It is the risk that ideas or questions put forward by one partner are not taken seriously by the other, or – in a worst-case scenario – will be ridiculed. This finding matches Shazi, Gillespie, and Steen's findings (2015) on collaboration in innovation teams. A possible consequence is that the partners, instead of being honest about the challenges they observe, or their lack of understanding of an issue, keep quiet about it, with the result that problems are not addressed nor solved, or original ideas are not brought forward, with detrimental effects on the collaborative project.

High degrees of ability- and integrity-based trust have the potential to counteract the two first risks just identified, and clear the ground for collaboration. Again, this finding reminds us of that by Shazi, Gillespie, and Steen (2015) on collaboration in innovation teams. It also confirms empirically Pollack, Barr, and Hanson's (2017) theoretically deduced proposition regarding building strategic alliances where no previous relations exist, i.e. that perceived ability and integrity play more prominent roles than benevolence in the initial phase, while benevolence is likely to gain more significance over time.

The risk of poor communication in a collaboration may be counteracted by benevolence-based trust, which has thus the potential to promote a more productive communication, leading to higher-quality project outcomes (cf. Shazi, Gillespie, and Steen 2015; Maurer 2010; Miles, Miles, and Snow 2005).

The fact that this occurs after a collaboration has been established, and that a sufficient level of ability-based and integrity-based trust is required for the collaboration to be initiated, means that the latter two trust dimensions may be seen as conditions for the relevance of the first. Benevolence-based trust may also be seen as the only trust dimension examined so far that functions as a performance facilitator, once collaboration has been entered into, enhancing open, high-quality communication and problem solving along a scale from zero to optimal level, with higher levels of trust corresponding to higher performance (Chang and Lee 2013; Hsu and Chang 2014).

A summary of the risks associated with low ABI on the network level and the inter-organisational level, as described in our data, along with potential consequences, the relevant trust dimensions and their outcomes are presented in Table 4.

The second research question has been: *How does trust based on perceived ability, benevolence and integrity promote involvement despite the perceived risks, and how does this influence network performance and outcome in the form of knowledge sharing and innovation?*

Starting again with the network level and addressing the first risk related to return on time invested, ability-based trust seems to be the primary dimension: Higher network ability increases the probability that members will find the information that they seek and get a sufficient return on the time they invest in the network. Higher ability-based trust, thus, has the potential to promote more network involvement and prevent withdrawal. As to the risk involved in information sharing, the typical strategy of network members is to demand confidentiality. This only works, however, if the network is perceived to have high integrity, i.e., that it honours this confidentiality in practice. Therefore, higher degrees of perceived network integrity reduce the perceived risk involved in sharing information and increase the probability of such sharing.

Is there a conditional relationship between the trust of the two cases just presented? Above, we noticed that if the risk associated with information sharing grows high, then network members may stop sharing, something that will increase the risk of no or little return on invested time. We also noticed that the latter risk may reach critical levels, even if perceived network ability is high. This means that ability-based trust is not in itself sufficient to counteract the risk of low return on invested time. Integrity-based trust is necessary, too, in order to counteract the risk involved in information sharing. This indicates that integrity-based trust is a condition for ability-based trust, i.e., a condition for its relevance, and that both promote network involvement and prevent withdrawal from the network.

According to the interview data, benevolence is also a condition for knowledge sharing: Without any proclivity to help or assist others, the firms would not bother to share anything. This means that benevolence-based trust could be ascribed a similar status as integrity-based trust in the argument just proposed: Before ability-based can become relevant, benevolence-based trust must reach a certain level. Thus, there is a conditional relationship between the two trust dimensions, benevolence-based trust being a condition for ability-based trust. This means that both integrity-based trust and benevolence-based trust are conditions for the relevance of ability-based trust, and that both promote network involvement and prevent withdrawal from the network.

Additionally, one could argue that benevolence-based trust has also another effect in the examined trust dynamics: Like integrity, it counteracts the perceived risk of



Table 4. Network and inter-organisational level risks, consequences, relevant trust dimensions and outcomes.

Level	Risk	Consequence	Relevant trust dimension	Outcome
NETWORK	Time invested in network meetings yields low or no return Low ability in network threatens individual reputation Benevolence may not survive in a crisis Network member does not honor agreements, e.g. on confidentiality	Firms withdraw from network or reduce network activities Firms withdraw from network Reciprocal helping and knowledge sharing would stop Undermines the very existence of the network	Ability Ability Benevolence Integrity	Increased involvement in network Firms remain in network Reciprocal helping and knowledge sharing The network continues
INTER-ORGANISATION	Low ability in partner may threaten joint deliveries and firm's future reputation, resulting in economic loss and deterring future customers Low benevolence in partner may result in your partner ridiculing your question Low integrity in partner results in partners not honoring agreements, e.g. on confidentiality	Initial phase: Collaboration is not initiated Collaboration phase: Low quality communication and problem solving Initial phase: Collaboration is not initiated	Ability Benevolence Integrity	Initial phase: Collaboration is initiated Collaboration phase: High quality communication and problem solving Initial phase: Collaboration is initiated

Source: The authors

information being used opportunistically. If a network partner takes another partner's interests into account, i.e., practicing benevolence, then the former partner is less likely to act opportunistically. In this case, benevolence-based trust promotes knowledge sharing along two distinct paths: Firstly, it may be associated with a proclivity to help others, which may involve sharing information when others need it; secondly, it counteracts the risk of opportunistic misuse of the information shared. This makes benevolence-based trust a highly significant and potentially powerful trust dimension at the network level.

Interestingly, this latter point is confirmed by the regression analysis. Here we find a significant positive correlation between higher levels of perceived network benevolence and higher levels of knowledge sharing in the network, as reported by the firms. None of the other variables measuring ability- or integrity-based trust yields significant findings here. A significant positive correlation, however, is also found between perceived benevolence and innovation. This is congruent with the proposition made at the outset of this study: That trust is conducive both to higher-quality communication and knowledge sharing, and – through this effect – to innovation. However, while earlier contributions have mostly made this point for trust in general, our study points out that trust based on benevolence is the most significant dimension in this respect.

A final significant finding from the regression analysis is that reduced network benefits following conflict are significantly negatively correlated with reduced levels of integrity. This finding supports the interview data on how low integrity could undermine the functioning of the network, that is, at the network level.

At the inter-organisational level, benevolence-based trust is identified as particularly salient for promoting open and honest communication and knowledge sharing, enabling both more successful collaboration in general, and innovation more specifically. Benevolence-based trust here functions as a performance facilitator. Ability-based trust and integrity-based trust are relevant in the sense that they need to reach a certain level for a collaboration to be initiated.

This study has some limitations. The number of respondents is somewhat low, most firms are small and medium-sized, and the networks are located within the same region in a high-trust nation. Also, the effects shown by the regression analysis are not very strong. This calls for a conservative assessment of the validity of the findings. Moreover, the perceived risks highlighted in the interviews may be representative of the specific networks explored; that is, in other networks other risks may be more prominent. To check this eventuality, future studies investigating the trust dynamics involved in other risks would be useful. Finally, the finding related to conflict and integrity is a preliminary first result that needs to be investigated further.

This study has theoretical and practical implications. *Theoretically*, it contributes to the innovation literature by a more nuanced understanding of how innovation is influenced by trust in the context of innovation networks. The study contributes to the trust literature also by arguing that a distinction should be made between inter-organisational trust, i.e., between member organisations in a network, and network trust as the trust directed at the network in general. However, while siding with those authors who demand a differentiation between different levels when studying trust (Fulmer and Gelfand 2012), it also emphasises a common, underlying logic present at all levels, namely that specific instances of trust must be understood in relation to

specific instances of perceived risks. Within this context, it also adds to the growing literature emphasising how trust based on ability, integrity and benevolence needs to be distinguished, as they do not necessarily relate to the same perceived risks; their significance may therefore change from one setting to another, or from one phase in a developing relationship to another (McEvily and Zaheer 2006; Shazi, Gillespie, and Steen 2015). This study is also among the first to apply the ABI framework to innovation networks of the type referred to earlier. Here, it demonstrates the particular significance of benevolence-based trust in explaining variation in network involvement and outcome. Finally, it contributes to a discussion that has only just started, addressing the question of how various forms of trust may function more as conditions or facilitators, which holds implications for how crucial trust really is for successful collaboration. *Practically*, the study can help firms and network managers to achieve a better understanding of the value of the different dimensions of trust in the context of networks, and of how such dimensions influence each other in different areas and phases of network collaboration, enabling a more productive network facilitation.

Acknowledgements

This work was supported by the Norwegian Research Council's VRI program (project 238968).

Disclosure statement

No potential conflict of interest was reported by the authors.

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