Connect with care: informal knowledge protection practices to enhance knowledge sharing in networks of organizations

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Abstract

Purpose – This paper aims to clarify how organizations manage their participation in networks to share and jointly create knowledge but also risk unwanted knowledge spillovers at the same time. As formal governance, trust and observation are less applicable in informal networks, the authors need to understand how members address the need to protect knowledge by informal practices. The study aims to investigate how the application of knowledge protection practices affects knowledge sharing in networks. The insights are relevant for organizational and network management to control knowledge risks but harvest the benefits of network engagement.

Design/methodology/approach – The authors opted for an exploratory study based on 60 semi-structured interviews with members of 10 networks. In two rounds, network managers, representatives and members of the networks were interviewed. The second round of interviews was used to validate the intermediate findings. The data were complemented by documentary analysis, including network descriptions.

Findings – Through analyzing and building on the theory of psychological contracts, two informal practices of knowledge protection were found in networks of organizations: exclude crucial topics and share on selected topics and exclude details and share a selected level of detail. The authors explored how these two practices are enacted in networks of organizations with psychological contracts.

Originality/value – Counter to intuition that the protection of knowledge can be strengthened only at the expense of knowledge sharing and vice versa, networks benefitted from more focused and increased knowledge sharing while reducing the risk of losing competitive knowledge by performing these knowledge protection practices.

Keywords Knowledge risks, Knowledge protection, Knowledge sharing, Informal practice, Networks, Psychological contract

Paper type Research paper

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1. Introduction

Nowadays, not only have production processes become more agile and involve increasingly frequently changing actors, but also knowledge-sharing processes are more flexible and agile (Kaiser *et al.*, 2021). In this context, networks become increasingly important, and firms acquire, share and jointly create knowledge in networks (Thalmann and Schäper, 2018). At the same time, firms have to protect their critical knowledge from appropriation by external parties (Marabelli and Newell, 2012; Durst, 2019). Thus, organizations need to find a balance between knowledge sharing and protecting (Loebbecke *et al.*, 2016) and contrast benefits and risks when deciding with whom and how to engage in inter-organizational knowledge-sharing activities (Zanarone *et al.*, 2015).

Research on tensions between sharing and protecting has focused on dyadic knowledge exchange relationships in formal settings, such as strategic alliances (Pahnke *et al.*, 2015). However, in times of IT-mediated work processes, networks become increasingly important. In such networks, not all members know each other sufficiently well, and it is often not even clear who participates (Phelps *et al.*, 2012). Researchers found that in comparison to dyadic relationships, formal protection measures as well as governance frameworks are less effective in groups with direct competitors and for non-contractible knowledge (Zanarone *et al.*, 2015), as in networks. Instead, researchers found informal measures are more suitable protection mechanisms in many cases (Di Stefano *et al.*, 2014; Kaiser *et al.*, 2021; Zeiringer and Thalmann, 2020). Therefore, knowledge protection in networks is more complex, self-regulated and challenging compared to dyadic relationships and needs further investigation (Pahnke *et al.*, 2015). Little is known about informal knowledge protection practices, how they are enacted and used to balance knowledge sharing and protection and how they impact knowledge share in networks. Therefore, we address the following research question:

RQ1. How do informal knowledge protection practices affect knowledge sharing in networks of organizations?

Building on the theory of psychological contracts (Rousseau, 1989), we investigate self-regulated management of protection and sharing in networks of organizations. We found two knowledge protection practices where members either exclude crucial topics from their communication or omit details and concentrate on sharing meta-level knowledge.

2. Background

According to the knowledge-based view of the firm, knowledge is the most significant resource (Grant, 2002) and must be protected from loss, obsolescence, unauthorized exposure, unauthorized modification and erroneous assimilation (Holsapple and Joshi, 2000; Manhart and Thalmann, 2015). Research shows that managing knowledge risks positively affects organizational success (Durst, 2019).

Knowledge creation theory views the organization as a knowledge-creating entity and argues that not only knowledge but specifically the capability to create, share and use knowledge is the most important source of a firm's competitive advantages (Nonaka, 1994). Increasingly, firms' competitive advantages depend on their ability to cooperate with partners and sharing resources to collaboratively develop knowledge (Nguyen, 2020).

In general, organizations that promote knowledge sharing among their employees generate competitive advantages (Argote and Ingram, 2000). However, in inter-organizational settings, organizations prevent unwanted knowledge spillovers (Kaiser *et al.*, 2021), reduce knowledge visibility (Sedighi *et al.*, 2018) and reduce knowledge loss (Sumbal *et al.*, 2020; Norman, 2004; Jennex, 2014) to ensure relevant knowledge

stays within organizational boundaries or cannot be appropriated by competitors (Manhart and Thalmann, 2015).

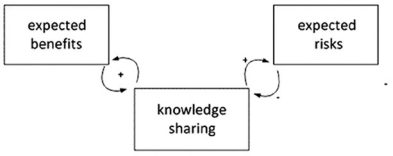
However, engaging in inter-organizational knowledge-creation activities requires organizations to simultaneously share and protect knowledge (Loebbecke *et al.*, 2016; Bogers, 2011; Thalmann and Ilvonen, 2018). So far, researchers discuss the simultaneous management of knowledge sharing and protection in general for different management decisions, for example to define an intellectual property rights regime (Rouyre and Fernandez, 2019; Castellaneta *et al.*, 2016) or select cooperation partners (Toh and Polidoro, 2013; Hoffmann *et al.*, 2018). These decisions contrast expected benefits and expected risks of knowledge sharing (Figure 1). Thereby, organizations engage in a knowledge sharing partnership if the expected benefits from knowledge sharing exceed the expected risks caused by this partnership.

We can observe a virtuous cycle between expected benefits and knowledge sharing: More knowledge sharing increases the expected benefits (Cabrera and Cabrera, 2002; Nguyen *et al.*, 2019) and more expected benefits increase the willingness to participate in knowledge sharing (Cabrera and Cabrera, 2002; Silva de Garcia *et al.*, 2020; Nguyen *et al.*, 2019).

Additionally, more knowledge sharing increases the expected (knowledge) risks (Al-Ajmi and Al-Busaidi, 2022; Zeiringer and Thalmann, 2021; Thalmann *et al.*, 2014), and higher expected risks reduce the willingness to participate in knowledge sharing (Temel and Durst, 2021; Durst, 2019; Al-Ajmi and Al-Busaidi, 2022; Thalmann *et al.*, 2014). Thus, we can observe a vicious cycle between expected risks and knowledge sharing. As knowledge sharing is connected to both cycles and thus a change of knowledge sharing influences both risks and benefits, an equilibrium between benefits and risks will be established.

Knowledge management literature discusses some major factors influencing both cycles. Regarding the virtuous cycle, the benefits of knowledge sharing highly depend on the *diversity of knowledge* offered in the sharing space and the internal *demand for knowledge.* Diversity especially in a sense of complementary knowledge held by other sharing members generate high perceived benefits (Niesten and Jolink, 2020)(Muzzio and Gama, 2024). Higher knowledge demands lead to a higher perceived valuation if this demand is fulfilled (Matson *et al.*, 2003) and thus is mentioned as important factor to engage in knowledge sharing (Antonelli, 2017).

Regarding the vicious cycle, the most important factor determining knowledge risks is *competition* between knowledge sharers (Trkman and Desouza, 2012; Kaiser *et al.*, 2021). In this sense, critical knowledge can generate an advantage over competitors, which offer services or products in the same markets (Kaiser *et al.*, 2021; Sarigianni *et al.*, 2015). A disclosure or loss of critical knowledge would reduce or even eliminate this competitive advantage so that the knowledge risk can manifest into a real business loss and thus harm the organization (Durst, 2019; Temel and Durst, 2021; Zeiringer *et al.*, 2022). Another important factor is the *complexity of knowledge,* which refers to the level of codification and teachability



Source: Created by the authors

Figure 1.
Risks and benefits of knowledge sharing

determining the speed of knowledge sharing (Kogut and Zander, 1992) and is frequently described as barrier for knowledge transfer (Bou-Llusar and Segarra-Ciprés, 2006; Sun and Scott, 2005; Pirkkalainen and Pawlowski, 2014). In this sense, complexity of knowledge can also be a barrier to unwanted knowledge spillover and thus reduce the perceived risks of knowledge sharing (Manhart *et al.*, 2015; Windsperger and Gorovaia, 2011).

Organizations usually rely on a diverse set of formal and informal protection measures to manage knowledge risks. Formal governance comprises mechanisms that foster goal alignment and coordinate activities between different parties, and are characterized by explicit controller descriptions (Lioliou *et al.*, 2014). Formal contracts are often supplemented by informal agreements, summarized under the term "relational governance" (Wiener *et al.*, 2016), which rests on the assumption that the governance of relationships involves more than crafting and enforcing formal written contracts. Such informal agreements aim at reducing transaction costs involved in crafting and enforcing formal agreements by trying to influence implicit determinants of controlled behaviors (Dyer and Singh, 1998).

Research found that formal protection measures in strategic alliances are less effective than informal measures, such as to build trust (Gulati, 1995) and relational capital, or to closely monitor partner behavior (Kale *et al.*, 2000). This is particularly true for highly competitive settings (Oxley and Sampson, 2004) and for non-contractible knowledge (Zanarone *et al.*, 2015). However, prior research has so far mainly focused on dyadic relationships between knowledge sharing partners, and the findings are often not applicable to network settings that have many indirect (transitive) ties (Hernandez *et al.*, 2015), or in networks in which (immature and tacit) knowledge is jointly developed (Leiponen and Byma, 2009).

In such settings, psychological contracts can simultaneously substitute and complement formal governance measures (Lioliou *et al.*, 2014). Psychological contracts describe commonly accepted patterns of interactions, which emerge as a result of social consensus (Rousseau, 1989; Rousseau, 2001). In contrast to a formal contract (statutory system of explicit expectations), the psychological contract is a broader concept focusing on beliefs about unwritten and implicit terms (Koh *et al.*, 2004) with relational properties that bind the parties (Robinson *et al.*, 1994). The transactional nature of psychological contracts relates to their validity for a bundle of actions rather than for single transactions (Koh *et al.*, 2004; Rousseau, 2001), and their central characteristic is the capacity to reduce insecurities and anticipate future exchanges (Dabos and Rousseau, 2004). Thus, future (trans)actions become more predictable by each party, facilitating more effective planning and coordination (Rousseau, 1995; Wellin, 2016). A mutual and reciprocal agreement is key for the successful application of psychological contracts (Dabos and Rousseau, 2004). This agreement creates strong psychological accountability, entailing high levels of self-control by the partners. In contrast to formal contracts, psychological contracts do not explicitly control the behavior of network members, but due to their mutual and psychologically binding nature, they function in a similar way as formal contracts (Lioliou *et al.*, 2014).

In this paper, we consider that every member has individual psychological contracts with the network specifying the terms of exchange agreements. Implied contracts as a subgroup of psychological contracts prescribe agreements that are the result of finding social consensus among all members and thus a representation of self-regulation in networks (Rousseau, 1989; Rousseau, 2001). Therefore, focusing on implied contracts seems suitable for an investigation at the network level.

3. Method

We performed a purposeful sampling (Suri, 2011), to identify networks with a clear focus on knowledge sharing and with members who are competitors. Purposeful sampling is widely used in qualitative research for the identification and selection of information-rich cases

related to the phenomenon of interest (Suri, 2011). Thus, we considered purposeful sampling as suitable, as we needed knowledgeable interviewees for the in-depth discovery of knowledge sharing and protection in networks.

We identified the network characteristics in a document analysis and informal talks with network representatives. The selected networks differ in size, industry, geographic distribution and size of member firms (see Table 1). However, all networks are characterized by voluntary participation and knowledge sharing as their primary goal. Both characteristics are highly relevant for investigating informal practices of knowledge protection.

Two authors conducted 60 semi-structured interviews, all audio-recorded, with members of ten networks (five located in Austria, five located in Germany, see Table 1). Semi-structured interviews are widely used in explorative research due to their ability to balance comparability and explorative freedom (Patton, 2002). For our research, it was necessary that interviews have common pivotal questions that align with the overarching research objective and thus enabling comparability across different interviews. Simultaneously, semi-structured interviews provide the necessary flexibility to uncover novel and unexplored aspects within the field of study. The interviewees are predominantly company owners, engineers or planners who care about innovation and quality management topics. The study was organized in two rounds.

In the first round, we conducted 52 interviews, of which were ten semi-structured face-to-face "kick-off interviews" of approximately 2 h each with network managers, founders or senior-level representatives who had a good overview of each network. We collected data on network demographics, sharing and protection behavior in the network. We asked representatives to propose suitable candidates for additional interviews and contacted the suggested persons for 42 semi-structured follow-up interviews of approximately 1 h each with network members who were directly involved in knowledge sharing on behalf of their organizations.

In the second round, we conducted eight interviews of approximately 1 h each to check whether we had interpreted and conceptualized the feedback from the interviewees given in the first round appropriately and to investigate specific questions that appeared in the coding and conceptualizing in more detail. We addressed three interviewees from the first round and five new interviewees to increase the validity of the findings.

Network (ID)	Sector	# of member organizations	Round 1	Round 2
N1	Sustainable construction	130	6	–
N2	Sustainable construction	30	5	3
N3	Electrical craft	92	5	–
N4	Construction industry	270	6	2
N5	Construction craft	1,600	6	–
N6	Renewable energy	85	5	–
N7	Information technology	108	5	–
N8	Health	63	6	1
N9	Engineering	83	4	1
N10	Tourism	139	4	1
Total interviews			52	8

Source: Created by the authors

Table 1. Overview of networks and interviews

We hired professional transcription services familiar with the interviewees' local dialects to transcribe the interviews in the respondents' languages. We cleaned the transcripts and checked for correctness before we analyzed them with Atlas.ti. We pursued an iterative, overlapping approach to data collection and analysis to incorporate insights from past interviews into subsequent interviews and to sharpen the investigation of phenomena related to the research question. After all data had been collected, we re-coded the complete data set in an iterative three-step approach:

(1) informed inductive coding;
(2) axial coding; and
(3) cross-case analysis.

We applied *axial coding* and collected all codes in a codebook, with descriptions of each code and rules for application. The central result of the coding was the establishment of two knowledge protection practices and conditions for their application.

To better understand the motivation to share and protect knowledge, it was necessary to interpret interviewer statements in the context of each network. For this purpose, we analyzed documents and background for each network. To systematically take into account network characteristics, we conducted a *cross-case analysis* (Stake, 2013) and distilled pertinent themes with relation to the psychological contract theory, such as level of network identification, communication of contracts and themes related to knowledge sharing, such as types of knowledge shared. Each case was analyzed iteratively, and themes appearing in cases were recorded in tables to facilitate comparisons across cases. Finally, we clustered the cases and established four analytical cases in which one of the practices was dominant, with similar implied contracts and network characteristics.

4. Results

We introduce two knowledge protection practices for which we describe the motivation and the constraints from a benefit and a risk perspective plus their effects on knowledge sharing and protection. We use four analytical cases resulting from the cross-case analysis to show how implied contracts influence the effects and the conditions of the two practices. We found each practice dominant in two analytical cases and occasionally applied in the other two cases. We refer to the analytical cases and not to individual networks, even if quotes still link to individual networks.

4.1 First practice: exclude crucial topics and share knowledge on selected topics

We found the first protection practice dominant in five networks (N1–4 and N10), which are represented by two analytical cases.

4.1.1 Analytical cases. We describe the two cases according to their networks' goals and domain, the reasons organizations participate in and commit to the networks, how participants share and create what types of knowledge and how network management supports their activities.

Case_1 "Care for each other and push sustainable construction": N1 and N2 both focus on the development and promotion of sustainable construction and SMEs as member organizations from a broad range of crafts. Members share and jointly develop procedures and methods for straw bales (N1) and ecological construction (N2) to address the question:

Q1. How can we build sustainably?

The knowledge developed in the form of procedures and methods is codified and partly certified to push sustainable construction. The knowledge shared and jointly developed

focusses on interdisciplinary approaches extending the scope of one craft, incorporating approaches for how to deal with current regulations and certifications.

The implied contract of both networks is strongly rooted in their vision. Members are convinced that they contribute to higher missions and values (i.e. ecologic idealists), as one interviewee described: "I think you feel belonging to the network where the idealism of sustainable construction and making the world better to a certain extent, play an important role" (N1-2).

The implied contract based on this strong vision ("push sustainable construction") offers strong cohesion beyond professional relationships ("care for each other"). Members jointly develop new knowledge, which is presented in exhibitions, or in documented form in shared folders. Members enact their commitment to the implied contract through conclusive behavior to be kind and respectful and to promote sustainable construction.

Case_2 "Use the neutral zone to share legal topics": N3 consists of SMEs that provide electrical services, N4 of construction enterprises and N10 of tourism and leisure companies, such as hotels and providers of wellness products and services. Standards and laws strongly regulate the regional markets served by the member organizations of all three networks. Members share descriptions of organization-specific problem situations and experiences with adopting new standards or technical innovations (N3), contract law or EU legislation (N4) and contract or patent law (N10). Such sharing helps to establish knowledge addressing the question:

Q2. How can we adapt to new standards and laws?

Members share and jointly develop knowledge in regular discussion rounds to create awareness of new legal requirements, to explore and discuss possible solutions on social media or discussion platforms. Finally, network management distributes approved knowledge and developed solution proposals through e-mail lists.

All three networks have no idealistic vision; instead, members join for pragmatic reasons: They lack resources and need to participate in joint development of guidelines. Regarding the implied contract, members highlight that common professional honor forms the basis for collaboration:

> I need a certain system of values and similar expectations of goals. And this kind of giving and taking is, of course, very important. The rules of giving and taking are very clear, everybody contributes, and everybody benefits. This is an overarching theme (N3-3).

This expectation to avoid skimming and balance giving and taking was clearly communicated in all three networks. This implied contract is enacted as members use the networks' communication spaces as "neutral zone to share legal topics," where competition is abrogated.

4.1.1.1 Risk perspective. In both cases, members exclude topics because otherwise, they risk losing competitive advantages. Based on the shared agreement on the "neutral zone" in Case_2, as part of the implied contract, members restrict sharing to topics for which they all need to develop knowledge but that do not put their competitive advantages at risk:

> I can precisely tell you on which topics members share. On topics where all members have the same "level of suffering," they will obviously exchange, like problems with the processing of contracts. All topics that touch knowledge where members have competitive advantages [. . .] they do not share (N4-6).

Sharing topics related to their core competences is perceived as too risky; excluding such topics *reduces anticipated knowledge risks* and signals to participants that their need for

protection is taken seriously, and that it is acceptable not to share on sensitive topics. Both reduce barriers to participating, as a network manager reports:

> The challenge is to establish lively sharing in the network. Members will participate with a handbrake on when sharing about topics that touch members' competitive knowledge. They won't participate with a handbrake on when sharing on a selected non-competitive topic [. . .] they see the network as a somehow protected place (N4-6).

The last sentence shows the core element of the implied contract of N4, "the neutral zone," which motivates members, as participants expect fewer situations in which their sensitive knowledge is exposed. However, agreeing not to talk about risky topics and focus on less risky topics does not mean that crucial knowledge is 100% safe. Due to the interconnected nature of knowledge, other related, and riskier, topics might be touched upon. Thus, excluding risky topics reduces the perceived knowledge risks up front and the associated participation barriers. However, not only the willingness to participate but also the level of openness is positively affected, as a member from Case_2 who had a portfolio of networks for different sharing scenarios reported: "I have other networks where I do not share so many details like in this one. This network has another status for me, and it is important for me to share here" (N4-3). He pointed out that the community and professional honor (which is part of the implied contract) in this network motivate him to share more details. Active participation and detailed sharing allow members to benefit from others' knowledge and is part of the "balancing giving and taking" from the implied contract. At the same time, excluding competitive topics implies that higher participation and more detailed sharing do not increase the risks of losing competitive knowledge. However, this works only if members believe that all are committed to the implied contract, and that risky topics can be excluded. Based on this observation, we formulate:

4.1.1.1.1 Requirement1: members effectively ban risky topics (competition requirement). The network members' belief that other members stick to the practice is crucial for Requirement1. In this regard, the shared vision of a network is important in the implied contract, as a member explained:

> You have to have this shared vision, the construction owner, the participants of a workshop. We need to have the agreement that some want to share and some want to learn. [. . .] and to only share knowledge about three specific work steps: wood construction, assembling straw, rendering with clay. These topics are not conventional craft, and they are special. That is why we only cover these topics (N1-1).

Apparently, members consider construction with sustainable materials "special," as this is related to the shared vision of the network and associated with the network's goal of promoting sustainable construction. The perception (induced by the implied contract) that all members are committed leads not only to higher willingness to participate in the network's knowledge-sharing activities but also enables high-quality knowledge sharing, as one member explained:

> I take part in network workshops. There, you share detailed knowledge on topics related to sustainable construction, like straw-bale building. That's really important for jointly experimenting and finding new solutions together. This really pushes sustainable construction! I always hear from workshop participants that there is high-quality exchange but also this passion, openness and kindness for sustainable construction (N1-2).

The members expect that all other members are also committed to the network's goals and vision, which is part of the implied contact, increasing their knowledge-sharing activities.

In Case_2, a network manager stated, "However, if you exclude such [sensitive] topics, they really talk openly. Then you have a lively discussion" (N4-1). However, "during the discussion, you try to guide the group so that people stick to the topic and the outcome is something productive. [. . .] due to the restricted focus they perceive the workshops as very useful" (N4-4).

In this example, the network manager ensured that members stick to the selected topics and enforced the implied contract. Other members described this commitment as part of their professional honor. In both cases, *members expect a situation where all members commit*, which is induced by implied contracts. This commitment is crucial to believe that risky topics are not exposed, and that competitors have other interests (than to absorb others' competitive knowledge) to participate in the network's knowledge-sharing activities. Thus, we formulate:

4.1.1.1.2 Requirement2: members expect to contribute to selected topics only (commitment requirement). Summing up, if members are convinced that topics related to their competitive advantage can be excluded by selecting relevant topics for sharing, and further, if members are convinced that the other members stick to this selection and contribute, they are willing to actively participate. Thus, we formulate:

Finding1: Meeting the competition and commitment requirements is associated with a reduction in anticipated knowledge risks.

4.1.1.2 Benefit perspective. The networks selected topics where members have diverse knowledge arising from experience in different crafts and construction projects (Case_1) or from dealing with company-specific problem situations (Case_2). Because of the heterogeneity of knowledge available in the networks, members expect to gain new and meaningful knowledge from other members' contributions.

In Case_1, members expect that the sharing of professional knowledge by experts from a broad range of domains is useful for all participants in the communication space:

> We have a broad range of experts in the network; we have experts for different trades, planners, craftspeople, straw bale constructors, construction physicians [. . .] but also construction owners who wanted to try out things and we all can gain valuable insights from each perspective (N1-6).

The discussion of diverse viewpoints broadens the horizon of all participants, which intensifies the knowledge exchange so that members gain new and meaningful knowledge. In Case_1, this is supported by the implied contracts and their strong vision to jointly create interdisciplinary solutions to push sustainable construction.

For Case_2, members expect that a broad range of descriptions of organization-specific problems and experiences from dealing with those problems will help all members to adapt to new laws or standards, making the jointly developed guidelines more valuable. The more problems that are covered, the more comprehensive support a guideline can offer:

> You know that everyone has the same problems, if it is contract law, or [compliance with] technical requirements. Everywhere where we have the same level of suffering, there we exchange because it is giving and taking. That is indeed the case (N4-8).

The quote shows that members perceive the sharing as fair (rooted in the implied contract: balancing giving and taking). If the practice is applied to a topic that is relevant to all ("everyone has the same problems"), all members can benefit instead of only a few.

Therefore, we formulate:

4.1.1.2.1 Requirement3: member knowledge is complementary (diversity requirement). In addition to the diversity and complementarity of the knowledge held by network members, willingness to contribute is important. "Our members have very different

backgrounds [. . .], and this variety of experience is the spice which makes our network so powerful in developing something new [. . .] that's why we appreciate every opinion and every viewpoint" (N1-2). The quote illustrates that members appreciate input from everyone (which is part of their idealistic vision), and that they are also willing to contribute.

For Case_2, the more organizational application contexts and corresponding problems are considered, the more cases, and especially exceptions, can be discussed, which leads to the development of a more comprehensive and more valuable guideline. All members want that all contribute:

> Legal language is hard to understand by the companies. What the network does is supporting the members with the complicated legal matter and to provide them with instructions on how to adapt the law. This is the daily bread in the network. However, to provide support, to reduce complexity, you need back coupling with the members. You need input from the practice, how construction companies work. The more, the merrier (N4-5).

Apparently, members appreciate different perspectives. Legal experts and members interact to discover diversity in how construction companies work to provide proper guidelines and to instruct the companies how to implement the law. Members can, at the minimum, contribute their experience with materials and methods for sustainable construction (Case_1) or problem descriptions related to new standards or laws (Case_2). This broad participation and the expectation that all gain valuable knowledge (everyone needs the guidelines) lead to a situation where members work jointly for the common good (based on the neutral zone from the implied contract). A network manager highlighted the reasons for knowledge exchange:

> There is strong exchange in our [communication space] with the selected topic on legislation issues. [. . .] there the value of the participants to share is high and they tell me this. I mean they join this [communication space] voluntarily whilst they have time pressure, revenue pressure. But they all take their time to drive two hours in the morning to spend time here (N4-1).

Obviously, members commit to actively participate in the knowledge-sharing activities of the network as they expect to benefit ("value [. . .] is high") and feel committed to the network (implied contract: professional honor).

Thus, we formulate:

4.1.1.2.2 Requirement4: knowledge from every member matters (contribution requirement). If knowledge held by other network members is diverse and complementary, network members expect higher knowledge gains from sharing. Further, if the topics selected matter to them, and if participation is appreciated as valuable for creating new knowledge, they actively participate in knowledge sharing. We conclude:

Finding2: Meeting the diversity and contribution requirements is associated with an increase in anticipated knowledge benefits.

4.2 Second practice: exclude details and share on a selected level of detail

The second protection practice was dominant in five networks (N5-9) represented by two analytical cases.

4.2.1 Analytical cases. Case_3 "Do not provide complete solutions": N5 is an international online community of SMEs from different trades and laypersons that focuses on the preservation of timber-framed houses. The core of the network's implied contract is that members feel they are "fighting" against external forces, such as government or big companies that prevent timber-framed houses. Therefore, members strongly identify with the network and its goals. The professional members have clear protection concerns that

they enforce by "providing incomplete solutions," which is a raw sketch of an approach lacking the details needed for implementation in practice (a complete solution would have the details). Nondisclosure of complete solutions ("red line") is communicated by members and by the network manager, and thus, is a central part of the implied contract. The network manager described this as "mutual respect":

> My network is very active, and almost every known expert participates. This is mainly due to the casual atmosphere and the mutual respect. Nobody is forced to exceed personal limits and nobody else goes behind the "red line"; this is important if real experts are talking to laypersons (N5-1).

However, this aspect of the implied contract is also boldly enforced as members notify, consult or warn members in case of violations, and the network manager excludes members who act differently. Thus, not being pushed to reveal details is really the core of the implied contract.

Members join the network to gain technical knowledge of timber-framed construction, to gain commissions to renovate such buildings and to monitor what is going on in the community. The network uses an online forum as the main communication channel for knowledge sharing.

Case_4 "Show competence without sharing critical knowledge": N6-9 are networks of SMEs from different industries: renewable energy (N6), information technology (N7), health care (N8) and engineering (N9). Each network has a regional focus and is managed by a network manager. Members join the networks mainly to gain necessary knowledge and to team up for publicly funded projects. Members are competitors and share immature project ideas. Members focus on two questions:

Q3. What do I need to know to access public funding?

Q4. What do we seek and offer for initiating new R&D projects?

Protection concerns mainly appear in the context of the second question, and members give a broad outline of a project idea without sharing the essentials.

The networks do not have a strong vision. Members join for pragmatic reasons. However, they all have a regional focus as part of the network's identity and implied contracts. Members care about their reputation in the local context and stick to informal rules, as one interviewee explained:

> Yes, you must care about which things, ideas you post in the network, because you cannot overdo it. You have to consider the rules of the game a little bit; they are informal, and show how far you can go (N7-3).

The "things, ideas you should avoid" are detailed discussions in the broad audience, as this scares other members. Therefore, part of the implied contract is that discussions in the public are generic, and that details are shared privately. Members share only as much knowledge as necessary to give an impression about what competences or ideas for a new project they offer or need.

4.2.2 Risk perspective. In both cases, members exclude details, because otherwise, they risk losing competitive advantages. Experts exclude details to avoid lurking and to maintain their chance to get a contract with a layperson (Case_3) and to avoid sharing outside joint R&D projects with fixed IPR and collaboration rules (Case_4). Experts' detailed knowledge is their competitive advantage, and they expect fair sharing conditions. This is ensured by the implied contract (mutual respect), and in-depth sharing happens in private forums if needed and agreed. In Case 4, members participate in the network to find suitable partners

for realizing new ideas, but the largest risk is losing these new and vulnerable ideas leading to a loss of competitive advantage:

> When you have a new and promising idea, you are very careful! If members have the same business idea, a similar product, or similar service, you are more likely to avoid sharing, since you know that they are working on the same stuff, and they can easily take your idea. If members are complementary, it might make sense to discuss the details in a private session (N7-3).

However, participants must reveal some details to check the interest and competencies of sharing partners. The crucial question is, what is the right level of detail and especially, regarding which sharing partner? One aspect is the transferability of knowledge to other contexts. If a knowledge-sharing partner operates in a different context, this can reduce the sharing risk, and network members can reveal many details. By contrast, if a person is very close, this person might catch up quickly even in a high-level discussion. In such cases, the complexity of the knowledge, i.e. the different levels of detail one can choose, is crucial in relation to the target group:

> If you have your idea, and you can describe it on an abstract level, I can't assimilate them one to one. Because your thoughts are not clear to me, you connect knowledge differently. But if you cannot abstract sufficiently, or I know your thoughts, assimilation might be easy, and you should desist from sharing (N6-3).

Therefore, only if a member perceives their new idea as sufficiently complex, sharing less detailed knowledge can reduce risks. Thus, we formulate:

4.2.2.1 Requirement5: members can abstract knowledge to avoid assimilation by others (complexity requirement). The implied contract is important as it says: "sharing of details happens in private sessions." Violating this agreement can "irritate" members and signal the expectation that they also should share details, as one member explained: "You have to know how far you can go [in discussing details] and when you irritate other members. This balance is very important in our network, and other members react, for sure, in cases of violations" (N7-3).

For example, in Case_3, members care about the "mutual respect" from the implied contract and react in case of non-compliant behavior: "In the network, you gain technical knowledge, and it is different from [wiki] where few people control content. This network is controlled by all members, if you do not comply with the rules, other members will blow the whistle" (N5-2).

The positive effect of this implied contract enforcement is that it leads to a situation where members feel confident that others stick to the practice as well. In the description of Case_3, we discussed that sharing less detailed knowledge and not sharing complete solutions on public communication spaces of the networks, such as a forum or discussion rounds is key for the attractiveness of the network. In-depth sharing (the second part of the implied contract) then follows in restricted communication spaces. Therefore, we formulate:

4.2.2.2 Requirement6: members contribute abstract knowledge only (commitment requirement)

Finding3: Meeting the complexity and commitment requirements is associated with a reduction in anticipated knowledge risks.

5. Benefit perspective

For both cases, members want to avoid lurking, and they expect that all members gain new and relevant knowledge. At the network level, members seek knowledge about partners and their ideas so that they can evaluate their potential. If this evaluation is positive, members start detailed sharing in protected subgroups. For example, in Case_4, members share only

as much knowledge as necessary to illustrate their competences (complexity requirement). This two-step approach (implied contract: sharing of details in private) is an essential part of the implied contract:

> In this network, it is more about [high-level sharing] to get the chance to meet other members [. . .] it helps you to get in contact with companies where you wouldn't get the contact elsewhere from there, informal in-depth exchange can emerge (N7-3).

To find exchange partners, he/she needs to gain a certain level of knowledge about other members and their ideas so that he/she can evaluate the fit:

> We are a small company in an interdisciplinary field; we cannot realize our ideas alone. We need input from other domains or collaboration partners and check in the network who has the right competence. [. . .] If you see a member can really bring your idea forward, and he is trustable, you will open the box and start detailed bilateral sharing (N6-2).

The member emphasized that he really needs to share knowledge about his new idea, because he hopes to get some complementary information and to find a complementary collaboration partner, and that this is a core motivation to engage in knowledge sharing. Thus, from a benefit perspective, members have a high need to share knowledge about collaboration partners and complementary ideas. Thus, we formulate:

5.1 Requirement7: members have a high need to share knowledge (demand requirement)

The regional identity and focus on reputation in the network is central for the implied contract in Case_4. Both result in higher participation and valuation of the participation in the network:

> Everyone is there, not only me but also all the executives, the whole company. We count this as working time, because it is crucial to establish contacts, to keep up to date and to broaden your horizon (N7-5).

Another implication of the regional identity and reputation rooted in the implied contract is that members appreciate active participation. In Case_4, members are convinced that they will find appropriate project partners because of their active participation in the network. In Case_3, laypersons benefit from active sharing of less detailed knowledge because this increases the chances of finding suitable solutions for their problems. Experts benefit because it increases the chances of getting commissions. Similarly, in Case_4, active sharing of less detailed knowledge increases the chances of finding suitable project partners. Requesting knowledge ("I have a problem, please help") is crucial to establish reciprocity, whereas as soon as one member helps another, an obligation to give something back is created:

> You give these members credit of trust so that you can ask them, "I have a problem here can you help me?" From a psychological perspective, this is so important because it generates reciprocity, because you know once you helped another member, they will also help me (N7-2).

Based on these findings, we formulate:

5.2 R8: knowledge from every member matters (contribution requirement)

Apparently, the application of the practice increases participation in knowledge sharing, as in Case_3, the higher visibility of competences and the accompanying quick and simple responses increase members' activities:

> The network is very active if I compare it to other networks. At least I am in the forum once a day. [. . .] Nobody pushes you to your limits, and everybody is searching for new perspectives and collaboration partners (N5-1).

The quote implies that the anticipated benefits lead members to participate regularly in network communication spaces so that they can spread less detailed knowledge. This increases the chances of finding a suitable project partner, leading to:

Finding4: Meeting the demand and contribution requirements is associated with an increase in anticipated knowledge benefits.

6. Discussion

This paper offers three contributions to our understanding of how organizations balance sharing and protection in inter-organizational knowledge networks.

6.1 First contribution: mechanisms for enacting knowledge protection practices

Figure 2 illustrates our theorizing of the two protection practices:

(1) exclude crucial topics and share on selected topics; and

(2) exclude details and share a selected level of detail.

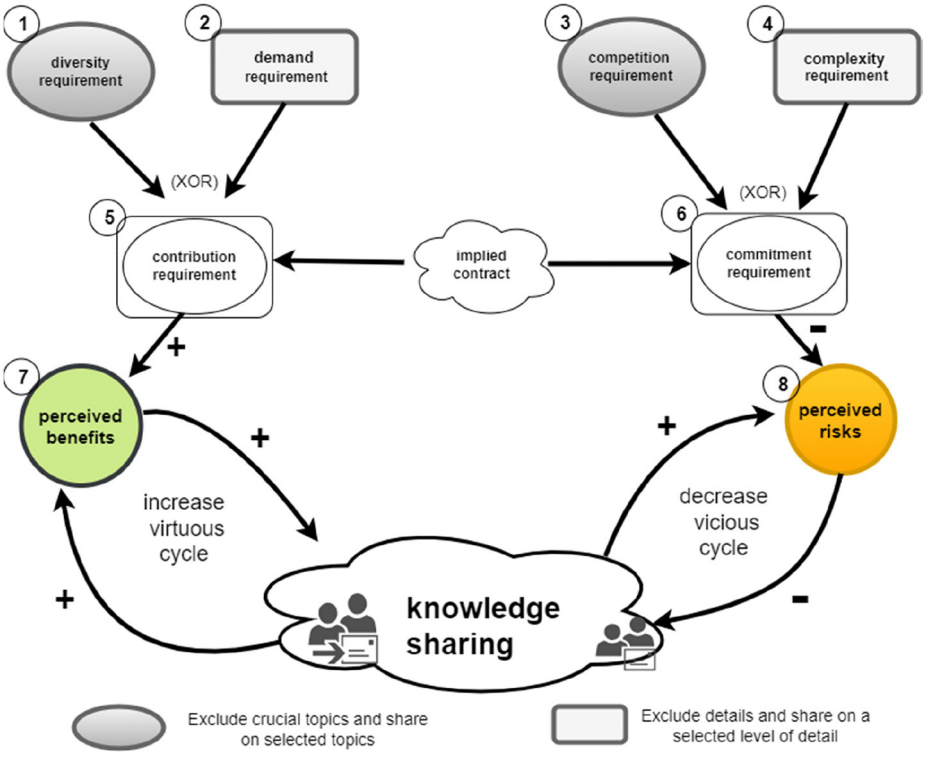


Figure 2.
Effects of practices on knowledge sharing

Source: Created by the authors

When members enact one of these protection practices, this happens based on a shared implied contract. We found four requirements:

(1) diversity;
(2) demand;
(3) competition; and
(4) complexity.

The diversity and competition requirements apply to the protection practice of excluding crucial topics and sharing on selected topics (dark grey), while the demand and complexity requirements relate to the protection practice of excluding details and sharing a selected level of detail. If the diversity or the demand requirement (depending on the practice) and the contribution requirement(5) are fulfilled, this increases the perceived benefits (finding 2or4). If the competition or the complexity requirement (depending on the practice) and the commitment requirement(6) are fulfilled, this reduces the perceived risks of knowledge sharing (finding 1or3). Fulfilled contribution and commitment requirements mean that members are convinced that other members stick to the practice. This conviction, however, requires an implied contract. On the level of benefit risk assessment, we previously discussed a virtuous cycle between perceived benefits and knowledge sharing plus a vicious cycle between perceived risks and knowledge sharing (see Figure 1). These cycles are affected by the identified protection practices. On the one hand, protection practices reinforce the virtuous cycle between benefits and sharing because members perceive benefits as enhanced by the fulfilled contribution requirement. On the other hand, protection practices diminish the vicious cycle between risks and sharing because members perceive risks as reduced by the fulfilled commitment requirement. Thus, it is more likely that the perceived benefits outweigh the perceived risks, and that members share knowledge more openly on selected topics or without details, depending on the protection practice. The knowledge shared in the network is still important for the members, even if the critical knowledge (topic or detail) is no longer the subject of sharing.

6.2 Second contribution: enactment of practices by implied contracts

Knowledge risks such as competitors as collaborators or limited trust are the main reasons for protecting knowledge (Temel and Durst, 2021). As an often unintended side effect, higher knowledge risks lead to lower knowledge sharing in networks (Jiang *et al.*, 2016). In the present cases, the two practices reduce such anticipated knowledge risks, i.e. the perceived likelihood of unintended knowledge spill overs for excluded topics or for detailed knowledge. Thus, members increasingly participate in sharing knowledge that does not put them at risk. In addition to reduced anticipated knowledge risks, the confidence that sharing partners contribute in the agreed way by sharing knowledge on selected topics or without details provides knowledge-sharing benefits. Members believe that the agreement (the implied contract) binds the parties involved to a particular course of action and thus, makes the behavior of other network members more predictable (Dabos and Rousseau, 2004). Therefore, the precondition for the risk reduction as well as the increase in the benefits of these two practices is confidence about the behavior of the other network members, which is enacted by the implied contract.

The application of implied contracts to influence knowledge-sharing behavior of network members adds to Marabelli and Newell's (2012) view on managing knowledge risks in networks, by emphasizing that, due to the nature of knowledge, individual arrangements must be found for every context. We showed that individual solutions for managing

knowledge risks are established in every network in a self-regulated way, and that these agreements are manifested in implied contracts. Nevertheless, we found two generic practices that are enacted based on the implied contracts. The findings also provide a more nuanced explanation for understanding that clearly communicating knowledge boundaries can facilitate knowledge sharing (Lee *et al.*, 2017). The implied contract defines the do's and don'ts of knowledge sharing, which makes the behavior of other network members more predictable, with the result that members perceive lower knowledge risks and higher benefits from sharing.

6.3 Third contribution: knowledge protection practices can lead to more knowledge sharing – but for different topics and details

Thus far, scholars have assumed that the more protective a partner is, the lower the level of knowledge sharing will be (Simonin, 1999). This is because more protective behavior reduces knowledge-sharing partners' motivation to contribute (Černe *et al.*, 2014). This is also in line with the principle of mutuality and reciprocity which is at the core of the theory of psychological contracts (Rousseau, 1989). A trade-off is created because sharing and protecting refer to the same knowledge without paying enough attention to what knowledge is subject to protection, what knowledge is subject to sharing and how they are related. This is not completely new, as previous studies found different levels of protective behavior for different types of knowledge (i.e. common vs core knowledge; (Norman, 2002) or operational vs technical knowledge (Singh and Gupta, 2020). However, thus far, scholars have not discussed how these different protective behaviors influence sharing (protection trade-offs in networks).

Although the present findings confirm the protection–sharing trade-off, we also show that the two identified protection practices can intensify knowledge sharing, but for other topics or without details. By excluding sensitive topics or details from sharing, members reduce knowledge inequalities and achieve a mutual agreement and reciprocal sharing of knowledge safeguarded by implied contracts. Trust plays still an important role. Our practices show that collaboration in informal and IT-based networks in which members do not sufficiently know each other can be the starting point for in-depth and trusted knowledge sharing taking place in private and secured communication spaces. This was frequently mentioned by our interviewees and would be an interesting avenue for future research.

6.4 Implications for the management of networks

Network managers can promote the two knowledge protection practices to facilitate participation for sustained development and growth of the member organizations and the network. The application of the two knowledge protection practices depends on the fulfillment of the requirements for topic selection (Practice1) or the requirements for sharing without details (Practice2). Establishing psychological contracts can be facilitated by managerial decisions in the context of knowledge management (Ishak *et al.*, 2023). Thus, management could facilitate the establishment of implied contracts that limit sharing of some knowledge on the networks' communication spaces to boost sharing of other knowledge. The findings also indicate that clearly communicating the networks' goals and vison is important for establishing such contracts. Therefore, promoting the identified practices and corresponding implied contracts can be beneficial for networks.

Moreover, our findings indicate that organizational management should make the strategic decision which knowledge can be shared under which circumstances. Based on this decision, they can select suitable networks that apply appropriate protection practices for

critical knowledge. This is important for employees participating in networks to consciously decide which topics are crucial and not subject to knowledge sharing and which topics are less risky. For sharing without details, it is important to assess the complexity of the knowledge and to determine which level of detail is safe. We recommend to define clear sharing policies so that employees can act accordingly in networks. Confidence in knowing which topics to share or which knowledge has sufficient complexity so that sharing without details is feasible would not only reduce the risk of unwanted outflows but also increase potential sharing benefits.

6.5 Limitations

Although the focus of the study was on networks of organizations, we interviewed individuals who represented their organizations in the networks. We raised awareness at the beginning of and during the interviews, but we could not completely avoid a mixture of individual and organizational perspectives. During each interview, we spent around 5 min clarifying the interviewees' role in the network and the focus on networks. Due to our purposeful sampling approach, we cannot claim for representativeness, and expert bias might have occurred. However, we critically reflected on this issue with network managers and within our research team and tried to reach consensus on all issues arising from potential selection biases.

Further, we conducted a qualitative interpretative study, which represents the focus of the interviewer in interview and discussions. This potential bias and subjectivity were mitigated by regular discussions during coding and intensive joint reflections. Finally, we conducted the interviews in German, and we note that our translations of quotations into English might bias their meaning. However, we addressed that issue by checking the translations over several rounds within the team of co-authors.

7. Conclusion

We identified two practices to explain how network members balance knowledge sharing and protection. Members enact both practices through implied contracts with all network members that address the risks of knowledge sharing. Counter to intuition that knowledge protection can be strengthened only at the expense of knowledge sharing and vice versa, we found that by performing these two practices, members anticipate increased benefits from sharing, while anticipated knowledge risks decrease. With the findings that applying protection measures intensifies knowledge sharing, but for other topics and details, we show that we need to reconsider the assumption of sharing and protecting as a trade-off.

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