KNOWLEDGE AND INTELLECTUAL PROPERTY MANAGEMENT IN CUSTOMER–SUPPLIER RELATIONSHIPS

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The purpose of the paper is to empirically study firms’ practises of knowledge and intellectual property (IP) management in customer–supplier relationships. The work applies the qualitative methodology of multiple case studies, and the material was collected in semi-structured interviews with management personnel at 36 organisations in Finland and in the Netherlands. Almost every firm had innovation relationships with their customers and suppliers, but the forms these relationships took, and the kinds of practices they involved, varied greatly. As a result, the firms considered the management of knowledge and IP in these relationships very challenging. We argue that by distinguishing knowledge management in the exploration phase of new business from knowledge management in the exploitation phase of innovation outcome, the firms could manage the knowledge and IP better. Accordingly, the paper introduces three propositions to support the knowledge and IP management in customer–supplier relationships.

Keywords: Knowledge management; intellectual property; innovation; customer–supplier relationship.

Introduction

Development of innovations and new business increasingly involves two or more actors, and often includes a customer and a supplier. Supplier participation in a customer’s product development process is not a new phenomenon. The post World War II rise in consumer demand and increased competition led firms to form closer relationships between customers (buyers) and suppliers (sellers),
especially in the automotive and electronics industries. At the same time, business processes developed in firms, and finally, Porter (1985) introduced the concept of a value chain that consists of a system of strategically important interdependent company functions or activities that create both costs and value. Value chain activities are organised around effective, but routine and repetitive processes and dyadic, hierarchical relationships between the customer and a supplier.

In the early stages of outsourcing, supplier involvement was essentially used for the implementation of innovation design in the value chain. Designs were largely developed internally by individual companies, which strictly maintained strategic control of their designs (Chiaromonte, 2002). In the 90’s, a new trend appeared due to changes in the competitive environment (the shortening of technology life cycles, the emergence of new markets, globalisation, and dispersed value chains). Firms began searching for new forms of external cooperation and opened up their new innovation and business development process in both directions of the value chain — upstream toward suppliers and downstream toward customers (see, e.g., Chesbrough, 2003; Bader, 2006; Chiaromonte, 2006; West and Gallagher, 2006; Henkel, 2006; Dittrich and Duysters, 2007; Blomqvist et al., 2008; Van de Vrande et al., 2009).

In this new economy, knowledge is the principal asset and its management and protection have become an integral part of a company’s competitive strategies (Hanel, 2006). At the same time, as the boundary between a customer and a supplier has become less clear, the distributed innovation practices make the management and protection of knowledge difficult (see, e.g., Jacobides and Billinger, 2006; Dittrich and Duysters, 2007; Elmquist et al., 2009). There are no reported best practices on how to share and manage the ownership and rights of the intellectual property (IP) of an innovation output from a joint project. Some literature is available on the management practices of knowledge and IP in research and development collaborations (see, e.g., Bader, 2006; Olander et al., 2009; Luoma et al., 2010), but instead of reporting on best practices and solutions, they report on diverse types of practices and the challenges resulting from these collaborations.

One possible reason for the shortage of best practices may be that the numerous forms of joint collaborative innovation make it difficult to replicate the knowledge management practices of any one firm. Also, early management practices in customer–supplier relationships in the value chain of new business development and offering have typically been divergent. For example, customers may have an “adversarial” attitude toward their suppliers, or may make more symbiotic arrangements with their key suppliers (Nichiguchi, 1994; Clark, 1989). In the adversarial approach, suppliers are not treated as important collaboration partners, but instead are evaluated primarily on the short-term price of their wares. Additionally, suppliers were expected to take much of the risk associated with variations in supply and
demand. This is very different from symbiotic arrangements where customers, while being strict on issues like quality, cost, and on-time delivery, may also share their knowledge with suppliers, help them in solving problems, encourage and support them to modernise their facilities and offerings, etc. In the new innovation era of the 21st century, these two approaches to the customer–supplier relationship are still found in the variety of forms of open or networked innovation.

In this context, this paper studies how knowledge and intellectual property are managed in collaborative innovation between customers and suppliers. We aimed to fill the gap in the research of knowledge management in collaborative innovation by conducting an interview study and analysing the empirical data together with findings reported in the literature. We studied the topic by examining the variety of collaboration practices that firms are using today in their customer–supplier relationships for innovation and new business development. The relationships are divided into two main categories: knowledge transaction relationships (where the collaboration focuses on transactions of existing knowledge and IP) and knowledge co-creation relationships (which refers to the creation of new knowledge and IP).

The paper is organised according to the following structure. Firstly, the models of inter-organisational innovation and sharing and protection of knowledge and IP are discussed in the context of the overall theoretical framework. The research methodology and design are then described. The results of the interview study are presented over the subsequent sections: the central findings from the cases, and their theoretical implications. Finally, propositions based on the findings and their practical implications and limitations are presented and discussed in the concluding section.

Models of Inter-organisational Innovation

There are several different recognised forms of inter-organisational innovation, varying from partnerships and concepts of extended enterprise (Dyer, 2000), to open innovation (Chesbrough, 2003), creation nets (Hagel and Brown, 2006), and co-creation and lead-user innovation (von Hippel, 1988, 2005). Valkokari et al. (2009) use the term ‘networked innovation’ to cover all of these forms of collaboration. Each has special characteristics related to the creation, transfer and protection of knowledge and IP. The paradigm of open innovation is based on the transfer of ideas and IP across company boundaries. In the concepts of co-creation, creation nets and extended enterprise, the competitive advantage is jointly created and shared by the actors in question. This joint-creation and profit sharing, however, may take a variety of forms, depending on factors such as which business models the actors utilise in these relationships.
A business model has two main functions: to create value and to capture a portion of that value (Chesbrough and Rosenboom, 2002). For companies in the new knowledge intensive economy, knowledge and its legally controllable appropriability regime, intellectual property, play an important role in both creating and capturing value (Teece, 1998). In the past, a typical, simplified business model involved developing and manufacturing a product and then selling it with a profit margin. In the new knowledge-intensive economy, while firms are still selling products for profit, their delivery is connected to other products, services or knowledge more than ever before. Accordingly, firms are searching for new innovative business models to be applied for value creation and value capturing in their customer–supplier relationships (Chesbrough, 2006).

One example of an innovative business model is the interactive utilisation of open-source software (OSS) in the firms’ business: this involves donating IP and/or man hours to the collaborative development of an open-source project for value creation, and value capturing with the assistance of the open results of collaborative work and/or the offering of related products or services (West and Gallagher, 2006). The use of OSS communities is a novel example of inter-organisational innovation and new business development, but it differs from the other forms of customer–supplier innovation and new business development: while OSS communities that act as suppliers include unknown actors, all other customer–supplier relationships are formed between known actors.

In one piece of work on novel kinds of inter-organisational innovation relationships relevant to the present study, Dittrich and Duysters (2007) studied the evolution of R&D collaboration strategies at the Nokia Corporation from 1985 to 2002. They found that Nokia’s collaboration strategy changed drastically during this period in terms of exploration of new knowledge and in the exploitation of innovation output. During the exploration stage, Nokia made use of flexible kinds of legal organisational structures, while in the exploitation stage, Nokia formed legal alliances structured so as to enable long-term collaboration. Nokia becomes a company engaged in both local and international innovation networks. The supplier network no longer consists of plain subcontracting relationships, where the subcontractors offer more or less off-the-shelf knowledge/technology/resources in a classic buyer-supplier relationship. There were also examples where the buyer-supplier relationship evolved into a close one in which the boundaries between Nokia and its supplier simply faded away. A prerequisite of a closer relationship is that the supplier has some special knowledge/technology/resources that are complementary to Nokia’s capability. In such a customer–supplier relationship, the innovation relationship is based on trust and sharing information rather than a formal contract.

While Nokia’s is just one example of modern strategies for knowledge exploration and exploitation, the lessons learned could be useful for other firms in
knowledge intensive industries. However, in terms of sectors other than information technology, there have been few in-depth studies of novel customer–supplier relationships that target innovation and new business development.

In the field of inter-organisational structures for knowledge exploration and knowledge exploitation, in general, we can get support from the extant literature. Building on March’s (1991) distinction between the knowledge generation (exploration) and knowledge application (exploitation), Grant and Baden-Fuller (2004) derived a theory on knowledge management within inter-firm alliances that distinguished between knowledge acquisition and knowledge accessing alliances. Knowledge accessing alliances are for the exploration of new business, while knowledge acquiring alliances are aimed at exploiting an earlier innovation outcome.

**Sharing and Protection of Knowledge and Intellectual Property**

Managing knowledge and IP within inter-organisational innovation is challenging for both suppliers and customers. According to Polanyi (1966) all knowledge has a tacit component, and this tacit component makes the transfer of knowledge (including IP) across organisational boundaries challenging (Teece, 1998; Qvortrup, 2006). A transaction involving IP rights alone is usually not adequate for creating new products or services: the transfer of tacit knowledge is also required. Therefore, inter-organisational collaborative arrangements are often seen as an alternative for the IP transaction in order to create new innovations. Such collaborative arrangements, however, always contain additional risks (Pisano and Teece, 1989; Enkel et al., 2005).

Negotiations for collaboration require open communication and evidence of technological knowledge. At the same time, there is a major risk of losing strategic knowledge: a customer may use the knowledge for its own purposes or trade it with a supplier’s competitor, or vice-versa (Enkel et al., 2005; Blomqvist et al., 2008). The negotiations may also end in disputes regarding the ownership of ideas which could arise in the course of the innovation process when the supplier’s and the customer’s knowledge is combined (Hagedoorn, 2003). A customer may feel that it owns all the ideas generated in the process, and this may cause conflict if the supplier already had the knowledge that the customer believed to have contributed, but the supplier had not proactively clarified the legal status (contamination of another’s knowledge). The opposite can also occur, especially if the supplier is a large company and the customer is an SME, because SMEs have less bargaining power in negotiations than large firms (Blomqvist et al., 2008; Olander et al., 2009). In order to avoid such problems, a variety of knowledge protection methods is used in the collaborative relationships: in addition to the formal protection
methods of IP, the firms are actively using contractual and informal methods of knowledge protection (Kitching and Blackburn, 2003; PRO INNO Europe, 2007; Leiponen, 2008; Olander et al., 2009; Luoma et al., 2010). For example, non-disclosure agreements (NDA) are commonly used in most inter-organisational innovation relationships.

Contracting is an essential part of establishing and managing any innovation relationships and the contracting capability is one the central assets of an innovative firm (Lee, 2008). But the ability to create and maintain trust in these relationships is even more critical, because trust covers expectations about what others will do in situations that cannot be explicitly specified in the contract (Blomqvist et al., 2008), even when flexible, open-ended terms are employed (Nystén-Haarala et al., 2009). Contracts and trust are not mutually exclusive and they equally create a supportive framework for both the successful exploration of new knowledge in inter-organisational innovation relationship and in the exploitation of the innovation outcome.

While the management of knowledge sharing and input in the process of innovation is challenging in customer–supplier relationships, knowledge and IP as inputs may be anticipated or even known to the collaborating partners in advance. On the other hand, the management of the IP related to the outcome of a joint-innovation is perhaps more challenging. This is because the results of the collaboration and the path (i.e., how the results were obtained) are seldom known beforehand. Furthermore, IP rights are modelled on the idea that one inventive idea or creation correlates to one right to a single product. Consequently, there is a substantial gap between the innovation practice and the model that IP law uses in areas where multiple entities are involved in the creation and use of IP and where the coordination is required (Lee, 2009). Accordingly, although the number of joint patents has increased during the past few decades, joint ownership of patents is generally seen by lawyers and firms alike as a second-best option that, if possible, should be avoided (Hagedoorn, 2003).

If the parties prefer to avoid joint ownership, alternative arrangements for the ownership and rights to use the innovation outcome should be sought in a customer–supplier relationship. In a traditional relationship model, a customer owns the results because it invested in the R&D either through direct compensation to the supplier, or in the price of purchased products or services. On the other hand, extant literature suggests a correlation between the appropriation of IP and innovativeness (see, e.g., Levin et al., 1987). The party that obtains the rights to a newly created knowledge asset tends to improve it, build on it, and use it in a variety of applications (Leiponen, 2008). Accordingly, control-right allocation may therefore have dynamic effects on the supply relationship. Leiponen (2008) has shown that in long-term customer–supplier relationships, controlling rights over jointly created
knowledge assets should optimally be allocated to the partner that is best positioned to later make non-contractible investments, such as innovation and quality improvements, in the asset. While strictly controlling the IP may often be strategically important for a customer, the customer should gauge the benefits of a more optimal allocation of control rights in terms of this strategic goal through boosted incentives for long-term suppliers. In practice, this may not always be so straightforward. Bader (2006) has suggested that the more experience a partner has with IP issues in R&D collaborations, the more capable the partner is in establishing its interests in IP. In addition, the better the strategic fit between the partners, the more likely it is that a balanced IP model that satisfies both parties can be found. Furthermore, the more open the information exchange philosophy of the partner, the more likely it is that balanced collaboration contracts with respect to IP can be closed (Bader, 2006).

Research Methodology and Design

Although the extant literature mentioned above reports several empirical findings and specific theories about the management of knowledge and IP in open or networked innovation (e.g., Bader, 2006; West and Gallagher, 2006; Dittrich and Duysters, 2007; Blomqvist et al., 2008; Leiponen, 2008; Olander et al., 2009), the literature is either too general or too specific. The field is also still evolving and extant literature may not correspond to the state-of-the-art practices. Therefore, the objective of the study is to bridge the gap between the existing underdeveloped theories and practical managerial need on how knowledge and IP should be managed in innovation collaboration between customers and suppliers.

Because we are studying phenomena of open and collaborative innovation practices that are still relatively novel and evolving, we focus on qualitative data and use a multiple case study method to assist in building our theory (Eisenhardt, 1989; Yin, 2003; Eisenhardt and Graebner, 2007). The present study has an interpretative orientation and aims to understand the phenomena from the inside rather than the outside. The main research question of the paper is the following: How are knowledge and IP managed in collaborative innovation between customers and suppliers? This is further implemented through sub-questions that address the collaboration and innovation practices of the firms:

- What kinds of collaboration practices are the firms currently using in their customer–supplier relationships?
- How do the firms share and protect their knowledge in these relationships in the phases of exploitation and exploration?
- How do they treat the outcome of the collaboration (IP, tacit knowledge)?
Answers to the research questions are based on a large interview study about IP management practices in inter-organisational relationships conducted from February to October 2009, where 36 firms in Finland and in the Netherlands were studied by using semi-structured theme interviews. The interviews went beyond knowledge and IP management in customer–supplier relationships to cover a broad range of themes on IP management practices, but in this paper we focus exclusively on the customer–supplier relationships.

The empirical material of the study was collected by a group of 5 researchers (including the authors of this paper) who interviewed a total of 48 managers from 20 Dutch and 16 Finnish companies in face-to-face meetings. The firms represented different fields of industry and different firm sizes, bringing diversity to the empirical material and maximising the variety in the data (see Table 1). The criterion for the selection of a firm into the study was that the firm was generally known to be innovative and was among the leading companies in its branch of industry. The roles of both customers and suppliers were well represented in the group of interviewed firms. Some of the firms could be customers in one value network and suppliers in another. During the interviews we also found that there were a few active customer–supplier relationships among the interviewed companies. That, however, did not bring any additional aspects into the study.

The duration of a typical interview was 1–1.5 hours, and two interviewers were generally involved. Moreover, one author of this paper partook in every interview, which made it easier to create a similar approach for all the interviews in both countries. Semi-structured theme interviews were chosen as the main source of empirical material, because the study was partly explorative in nature and the meanings of concepts needed to be discussed with the interviewees. The interviewees were specifically senior corporate, R&D, business unit or IP managers. An interview usually began by enquiring into the company’s business and its role and position in the business environment of firm. The deeper inter-organisational relationships of firm were then discussed, the main focus being on innovation and new business creation and offerings. Step by step, more specific questions related to knowledge and IP management practices within the firm, and in their inter-organisational relationships, were investigated. The interview material was supplemented by product and company presentations and agreement templates from some of the companies. In some cases, the interviewees were also asked additional questions later on, in order to elucidate the company’s practices and motives.

Almost all interviews were recorded (we always asked and received permission for recording) and transcribed the subsequent material. The interviewers also made their own notes during the interviews. The analysis of the interview data was based on a computer-assisted analysis of the transcribed data combined with the notes
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garnered during the interviews. Search codes for the computer-assisted analysis have come largely from the extant literature.

The interview material was analysed by the authors of this paper, at first from the viewpoints of, “what kind of inter-organisational practices companies currently have in their innovation and new business development” and “how they are managing knowledge and IP in these relationships in general”. The results of a preliminary analysis were presented and discussed in two large workshops with the representatives of the interviewed firms: one workshop in the Netherlands and one in Finland. The focus of the analysis and theory-building then moved on to customer–supplier relationships and the authors then began addressing the research questions of the paper. The theory-building process involved iteratively incorporating the case data of the interviews, emerging theory, and extant literature.

Interview Findings

Collaboration practices

The interviews showed that almost all the included firms have innovation activities with their customers and suppliers. The detailed forms and practices of the collaboration, however, were much varied. The managers mentioned that the management of knowledge and IP is often challenging in these relationships.

One challenge identified in the interviews was related to the way in which companies understand the term “intellectual property” and use it in association with the firm’s practices. In the words of one interviewee, “At our firm we understand IP as intellectual property rights plus the know-how that can be covered by an NDA and other agreements.” While this is just one (but nevertheless representative) example, most managers said that tacit knowledge (or know-how) plays an extremely important role in their innovation, and expressed their desire to isolate and control the tacit knowledge related to collaborative innovation. The managers interviewed typically attempt to achieve this through different contracts (NDAs, employee agreements, collaboration agreements, etc.) in conjunction with company policies. Some firms even use the term “intellectual property” in contracts with the broader meaning — not only as IP rights that are granted and protected by the IP laws.

The early literature on open innovation addresses the role of IP as an instrument for the in-and-outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation (see, e.g., Chesbrough, 2003, 2006; Lichtenthaler, 2008). Our case findings, however, highlighted early collaboration between customers and their suppliers in the exploration of new knowledge. Nearly all of the respondent firms reported active collaborations among their customers and/or suppliers in their R&D and/or new product development activities. There was no
difference between manufacturing firms and service firms in that regard. Our findings are in line with those of van de Vrande et al. (2009). A sole transaction of explicit IP in customer–supplier relationships is rare in the case of innovation and new business development among the interviewed firms. When an IP transaction occurs, it is usually supported by the transaction of tacit knowledge. A collaborative co-creation of new knowledge may include background IP as a starting point, and it may end up in the transaction of an IP related to the innovation outcome, but the combination of the customer’s tacit knowledge with the supplier’s tacit knowledge was at the core of most of the collaboration practices between a customer and a supplier.

The following interviewee’s response to the question about the firm’s collaboration practices is characteristic of the change that has occurred: “Yes, of course we work with suppliers. When we introduce something new on a market, it’s always done with at least one or two other parties. Until three or four years ago it was quite a linear process: we had an idea, we organised the partners and started up the development project. Now it’s a little bit different, because you start in a very early step in the innovation process already together with your partner, develop the ideas together and then go into a joint project.” The response shows that collaboration with the supplier is inevitable, but the pattern of exchange has changed.

In addition to the various types of collaboration, traditional subcontracting is still a commonly used model in customer–supplier relationships. Many customers, however, considered subcontracting differently from other forms of collaboration. The words of this customer explain why: “I pay them for what they do for me, so it’s not a cooperation. In cooperation, the costs are shared (one way or another).” Subcontracting without sharing costs is not regarded as a collaboration but rather a unilateral transaction.

We observed a variety of practices both for the transaction of knowledge and for the co-creation of knowledge, including inside-out and outside-in licensing and selling of IP, joint venturing, explorative joint-projects, exploitative joint-projects, use of open source communities as learning or solution platforms, etc. Each of the practices has its own special characteristics and poses challenges related to knowledge and IP management. According to our findings, the situation is further complicated by the fact that the business models which actors utilise in these relationships do have an influence on the knowledge and IP management.

**Sharing and protection of knowledge in the exploration and exploitation of knowledge**

Most of the interviewed managers mentioned contracting as the most important method to protect knowledge in their innovation efforts with their customers/suppliers. Those firms typically explored new knowledge together with their
customers/suppliers by signing a brief NDA or a more extensive collaboration agreement at the beginning of the joint project. When providing the motivation for such agreements, one interviewee said: “It starts with people, let’s say gentlemen’s agreements. But to make sure that it goes from a personal relationship to a company relationship, we need confidentiality agreements.” Another interviewee explains: “In the past, collaboration was sometimes based on gentlemen’s agreements, but after one big case which had a negative influence on our stock exchange value, we started to pay closer attention to contracting.” Even a single negative influence impacts on the motivation to collaborate informally.

Typically, the reasons for not entering into a contract in the early exploration phase include cases where the joint innovation occurs unintentionally and cases that rely on gentlemen’s agreements. In the latter case, the collaboration is based on trust rather than on a contract.

Trust was generally seen as highly important in innovation: “Trust is necessary for co-creation to allow open sharing of knowledge.” At many companies, however, contracts and trust were not considered exclusive: they were seen as complementary. Managers also said: “There must be the right balance between them.” This “right balance” between trust and contracts was generally described as challenging: “That depends on culture. Let’s say, when you are collaborating with a foreign company from a “low-trust” country, you should have early and thick formal contracts, but when collaborating with a company from a “high-trust” country, you need only thin contracts.” More than one interviewee expressed that “paying too much attention to contracts at the very beginning of joint work kills innovation.” These managers considered contracting important but stated that if too much focus is placed at the start of the collaboration on “bureaucratic issues” and on dividing the potential benefits of the innovation outcome instead of focusing on practices supporting the actual collaboration, it is likely to have a negative impact on the results of the collaboration or even bring the collaboration to a halt. “You have to bake the pie before you divide it up.”

Informal protection methods, such as secrecy and publishing, were commonly mentioned among the most preferred ways to protect knowledge. While publishing is related to the innovation outcome and the exploitation phase (by publishing your results you can obtain a freedom of action and prevent others from owning the rights to the results), secrecy as a protection method is also applicable in the exploration phase of new knowledge. Companies would generally like to control what kind of knowledge and how much will they share with their customers/suppliers.

Knowledge sharing is pronounced during the knowledge exploration phase. Most of the interviewed firms explored new business by co-creating new knowledge together with their customers/suppliers. A good example of co-creating
follows: “Ideas typically surface at the interface. I mean, when you interact, you both bring in. So it’s like, hey, I have this idea, now describe your specific situation to me. That will lead to attempting the idea, evolving it, building on it, and then you get the great idea. But it’s a dialogue, and it’s always at the interface, the great ideas.” The example describes a relationship between a customer and a supplier where one can openly share its knowledge without the fear that this will later harm its business in one way or another. However, at times the fear is justified.

The firms were selective in terms of choosing collaboration partners. There has to be a good reason and motivation for collaboration. The statement “We have the know-why and they have the know-how.” describes a typical situation between a customer and a supplier. In a situation like this one, there is a good fit for the exploration phase of knowledge. However, this does not necessarily mean that the firms are fit to collaborate in the exploitation phase. In a successful innovation relationship, a good fit is needed for both phases.

Some firms are actively using OSS communities as suppliers. The challenge in using open source communities is that it is not possible to know all the actors involved in the community, which makes the management of knowledge challenging in these co-creative relationships. One interviewee noted that “you must be very careful when operating inside an open source community so that you do not inadvertently share any critical information that your competitor should not know, because they may also be there.”

Formal protection methods, especially patents and trademarks, play an important role in the protection of innovation outcome. Half of the interviewees mentioned patents as an important way to protect their knowledge. Those whose firms do not actively use patenting as a protection method gave business-related arguments such as “if you patent it, the information goes public”, “if you cannot control infringements of your patents, so why patent the technology?”, and “patenting is too expensive a way of protecting our knowledge”.

When discussing customer–supplier relationships in the interviews, the managers did not explicitly mention whether their companies distinguish between strategies for knowledge sharing and protection in the exploration phase of new knowledge and those used during the exploitation phase of the innovation outcome. Implicitly, however, it is obvious that many firms pay more attention to the management of knowledge and IP in the exploitation than in the exploration phase of new business.

**Managing the innovation outcome**

The interviews showed that firms are actively collaborating and searching for new methods in the exploration of new business, but the same cannot be said for the
exploitation of the collaborative innovation outcome. Although there were good examples of new practices and models to exploit the results, in most of the cases from the interview study the exploitation of results relied more on traditional business models, and novel innovation practices were limited to the exploration of knowledge.

The following is a good example of a case where the exploitation of collaborative innovation results was done using a traditional model: “We have strategic cooperation with a supplier which deliver a vital part of our product. We didn’t pay for them for the development. We have the IP but they have the first right for delivery and they amortise their development costs in the goods they supply. The downside is that we could make more profit if we could save a euro on materials, but that would require a new construction and a new development project with them (which is not of direct interest to the supplier in the used model of collaboration).” This is a very common example of a successful co-creation between a customer and a supplier where the rights of the joint innovation outcome were transferred to the customer. Through this IP transaction, the customer got full control to the rights of its product. However, in this same transaction, the customer lost control that would allow further improvement of the joint innovation. Obviously, this is an example of the non-optimised allocation of rights discussed in the section “Sharing and protection of knowledge and intellectual property” and in the study by Leiponen (2008).

There were also cases where the allocation of rights promoted innovativeness on the part of both the customer and the supplier. As an example: “We collaborate with a big material supplier. When they are developing new features for their materials, they sometimes provide us with samples for testing. Although we don’t get IP rights to the materials, because we are a small company in comparison to them, the collaboration is very beneficial for us. It promotes our own product development and we gain a competitive advantage by more quickly releasing new products based on these materials on the market.”

The following is an example of those few cases where the collaborative innovation was followed by a novel way to exploit the innovation outcome: “We lacked a good proprietary technology. Instead of developing that ourselves, we decided to team up with another company. Five years earlier, we would have tried to develop it ourselves, but at that point we said no. We might do that, but it would either take much longer or the end product would be inferior to the situation where we would team up with somebody. So what we did was that we signed a deal with them, defined a joint development program, and obtained an exclusive license. Both companies benefit from it, because all the sales and the licensing revenues, we had opted for a licensing model, are shared between us. To me that is a modern example of how you do innovation, because you really derive a lot of
strength from your partner, but you also bring very good things to the table.” As the interviewee notes, this is a good modern-day example of successful collaboration between a big company and a small technology supplier that has special knowledge in both the exploration and exploitation of new business. In terms of the exploitation of the innovation outcome, the interesting point is how the exploitation was made operational through a licensing model in which both parties gained revenues from the sales. This definitely represents a novel way to exploit the innovation outcome.

The case above is also an excellent example of a good “fit” between the companies in both the exploration and exploitation phases. This is not always the case. The following two cases describe the situation.

“A lot of innovation comes from customers. Sometimes we have a promising technology and we work with a lead customer to generate the first application on that. But we typically arrange it in such a way that we also get the results back and we use that for other applications. It’s a win-win situation, because the client can make use of our technology, but we also are able to use the results of that collaboration for different fields. So it’s innovation with the customer for their product, but also to enhance other possibilities.”

“It is often difficult to operate with a manufacturer. We want to have a new apparatus for our process. We know what we want to have, and they know how to make it. But they would not like to make it just for us but for everyone, also to our competitors. But the joint innovation is between us and the manufacturer.”

In the first case, the firms (a customer and a supplier) and their intentions fit well both in the exploration of new business and in the exploitation of the results. In the second case, there is not an adequate fit for the exploitation of the innovation outcome. In the latter case, it is the voice of a customer whose supplier is a large firm. There were also several cases in which the opposite occurred: A big firm that is in the role of the customer wants to own all the rights to the joint innovation so that it can seek out alternative suppliers for the innovation.

Our findings on the fit of firms are in line with the findings of Bader (2006), who studied IP management practices in R&D collaborations at four large service innovation companies (IBM, SAP, Swisscom, and Swiss Re). The results are also in accordance with those of Chesbrough and Schwartz (2007), who noted that business objective and business model alignment increases the chances of success in co-development partnerships.

In the cases presented in this section, the IP related to the joint innovation was allocated to one of the partners. In fact, all the interviewed companies said that they have few, if any, joint patents that resulted from collaboration in innovation. The companies tend to avoid joint patenting as much as possible. “We don’t favour joint patenting, and that is not only because of the increased bureaucracy it
entails. It’s what the management of joint patents through the life cycle of the patent involves. Twenty years is a long time and a lot can happen. There can be changes in the interests and ownerships of the firms. And that can make things very complicated.”

Theoretical Implications

The term “intellectual property”

Knowledge plays an extremely important role in inter-organisational innovation in all its various forms. It is part of the firm’s resources and represents capability in terms of the exchange of a special resource that makes a difference in a firm’s performance. Legal protection of the tacit part of knowledge, however, is unclear. Only explicit, codified knowledge can have clear legal protection (Teece, 1998). Firms would like to isolate and control the tacit knowledge related to inter-organisational innovation. Attempts to do that include contracts, company policies, and the use of term “intellectual property” in contracts in a broad sense.

The very term “intellectual property” as a legal expression is not uncontested (Gordon, 2003) and may include various patterns of human interaction as shown in the World Intellectual Property Organization definition (WIPO, 1979). Under national laws, IP law may include rights on, among others, patent, copyright, trademark, trade secrecy, rights in the topography of integrated circuits, industrial design rights, plant breeder’s right, publicity right, and database right. Regardless of whether certain knowledge is protected as an IP right, firms contractually and behaviourally control and isolate the knowledge and other intangible resources related to innovation, and may view any controllable knowledge as the “IP” of the firm.

The practice, which may further differ from a firm to firm, may cause misunderstandings and consequent problems in inter-organisational innovation. Thus it is crucial to align the practice of the firms and, to do so, all parties need to have one coherent understanding of the term. Accordingly, the term “intellectual property” may include not only IP rights that are granted and protected by the laws, but also the knowledge and other intangible resources whose use may be controlled by contracts, policies, organisation and process routines and norms, both physically and technically.

Collaboration practices of innovation in customer–supplier relationships

In order to understand and manage the complexity of knowledge and IP management in novel customer–supplier relationships, we derived a typology of the main types of collaborative practices in these relationships. We found that these practices generally involved either the co-creation of new knowledge (knowledge
exploration) or transactions involving existing knowledge (exploitation of innovation outcome). That finding allowed us to apply the theory of Grant and Baden-Fuller (2004) on knowledge management within inter-firm alliances and to extend it to customer–supplier relationships with non-equal partners. Accordingly, we divided the variety of novel customer–supplier relationships in innovation and new business development into two main categories according to whether the focus was on the exploration or exploitation of knowledge: knowledge co-creation relationships for the knowledge exploration (analogous to knowledge accessing alliances) and knowledge transaction relationships for knowledge exploitation (analogous to knowledge acquiring alliances).

In the knowledge co-creation relationships, the focus is on the creation of new knowledge and IP. In a customer–supplier relationship, this happens with a known partner (or partners, when the relationship involves networking). In both cases the relationship is closed in the sense that the actors can agree on issues related to the knowledge and IP management during and after the collaboration. The motivation behind the explorative collaboration could be in interactive learning with no direct commercial targets (R&D, benchmarking of best practices, etc.). There could also be direct commercial goals in the explorative collaboration which should be achieved by sharing and combining some special tacit knowledge of the actors, possibly with background IP, and in this way to co-create new innovations. The use of open source communities either as learning platforms or as solution platforms is increasing also in the business-to-business economy in customer–supplier relationships. For example, local service suppliers of a customer in a global network may learn from one another by sharing their experiences and thus improve their competitive advantage as a local service supplier in a customer’s global network. A customer may interactively use an OSS community or innovation mediator communities (e.g., Allio, 2004) as solution suppliers, just to mention a few examples. A typology of knowledge co-creation relationships is shown in Fig. 1.

In the knowledge transaction relationships, the focus is on the existing knowledge and IP and the new business is built on that. In a customer–supplier relationship having the focus in the development of customer’s business, it is the customer who is acquiring knowledge in some form from a supplier. However, because customer acquisition of ownership of the knowledge is different from obtaining the rights to use this knowledge, one should consider both the outside-in and the inside-out viewpoints of knowledge transaction. Cross-licensing (a special combination of outside-in and inside-out transactions of IP) is the third form of knowledge transaction, but it was found to be so rare in customer–supplier relationships that we decided not to focus on it. Outside-in transactions may take place either in closed relationships with known actors or in open relationships
involving unknown actors. An example of the latter is the licensing of OSS, where an open source community (acting as a supplier) holds full ownership to the code but specifies the usage rights to the customer. Closed forms of outside-in trans-
action include buying, licensing, and contracting the knowledge from a supplier to a customer. In buying, the customer may obtain exclusive rights to the knowledge or, alternatively, the transaction may result in joint-ownership of the knowledge between the customer and the supplier. In buying, the IP transaction could be accompanied by the transaction of the tacit knowledge necessary for the utilisation of the explicit IP through expert services (both rights and know-how) or through venturing or merging (both rights and business). In licensing, a customer may get either exclusive or non-exclusive rights to use a supplier’s IP. Contracting of knowledge refers to classical subcontracting work of a supplier based on existing knowledge. A typology of knowledge transaction relationships is shown in Fig. 2.

In the inside-out viewpoint, a supplier offers its knowledge and IP to a customer. The mechanisms are the same as in the outside-in but the viewpoint is different.

**Exploration of knowledge in customer–supplier relationships**

The empirical data highlighted two important aspects for achieving a solid framework that supports innovation in customer–supplier relationships: trust and agreements. The interviewees expressed how challenging both aspects were in the context of innovation and new business creation. Trust and agreements are also interconnected, and both are necessary, in accordance with the results of Blomqvist et al. (2008).
To find a right balance between trust and agreements at the early stage of the knowledge exploration phase (in practice, at the beginning of innovation design and development project), it seems that one should conclude a brief but adequate formal agreement where the parties agree on the intentions of the collaboration, on the main points of the development project, and on the main points related to the exploitation of the potential innovation outcome without going into too much detail.

Drafting a brief but adequate contract requires that both parties have a good level of contracting capability. The previous experience of the parties has a strong impact on the success. The firms should also understand what is strategically important to close and to avoid protecting any knowledge that is already known within the industry.

**Exploitation of innovation outcome in customer–supplier relationships**

The typology of knowledge co-creation and knowledge transaction relationships supports firms in the management of knowledge and IP in their customer–supplier relationships by distinguishing between collaboration models for the exploration of new business and those which target the exploitation of innovation outcome. The knowledge transaction relationships offer a variety of models to exploit existing IP.
If the existing business models of the customer and the supplier do not seem to fit with respect to the exploitation of innovation outcome, it is possible to produce a new business model for the exploitation where both parties can win and, thus, are motivated to work towards a successful joint effort. A business model may be created for the sharing of IP, and/or the sharing of its profits, the transaction of IP (for example, through venturing), etc. The typology of knowledge transaction relationships offers typical contractual elements for the business models to develop.

**Conclusions and Practical Implications**

In this paper, we have studied knowledge and IP management practices in innovation collaboration between customers and their suppliers. Interviews with managers from 36 firms in Finland and in the Netherlands showed that almost all of the firms have innovation activities with their customers and suppliers. However, different forms and practices in these innovation relationships are increasingly emerging. Furthermore, IP laws and the IP rights defined by the laws seem to stimulate innovation by single companies, and not joint innovation. As a result, the firms found the management of knowledge and IP in these relationships very challenging. To support knowledge and IP management in customer–supplier relationships, we distinguished between the exploration of new business and the exploitation of the innovation outcome.

Based on the extant literature and our empirical findings, we suggest three propositions as the contribution of the study: (1) a typology of inter-organisational innovation practices between customers and suppliers, (2) contracts that make a balance between trust and agreements at the beginning of the exploration phase, and (3) business models related to the typology of knowledge transaction relationships to make the exploitation of collaborative innovation outcome operational.

**Proposition 1a.** The joint exploration of new business takes place in a variety of different knowledge co-creation relationships, which can be described as a typology.

**Proposition 1b.** The exploitation of an innovation outcome takes place in customer–supplier relationships through transactions of existing IP, which can be described as a typology.

Our first theoretical contribution is the typologies of inter-organisational innovation practices in customer–supplier relationships. A distinction can be made on the typologies of customer–supplier relationships, depending on whether it is a question of the exploration of new business or the exploitation of an existing
innovation outcome. We distinguish the co-creation of knowledge and knowledge co-creation relationships for the exploration of new business from transactions of IP for the exploitation of the innovation outcome. In both of these typologies, IP is understood broadly to include not only IP rights that are granted and protected by the laws, but also the knowledge and other intangible resources whose use may be controlled by contracts and policies. Both knowledge co-creation and knowledge transactions relationships between customers and their suppliers contain a rich variety of different forms and practices, forming the typology of inter-organisational innovation practices in customer–supplier relationships.

Proposition 2. A concise formal agreement, concluded in the early stage of the exploration phase, helps companies share knowledge.

The second contribution of our study is related to finding the right balance between trust and formal contracts that is crucial in the successful management of knowledge in inter-organisational innovation. This contribution is operationally related to the management of knowledge and IP at the beginning of the collaboration, but its influence covers the entire life cycle of the innovation. A prerequisite to the successful joint exploration of new business in a customer–supplier relationship is that both parties be open and share their knowledge. In such a relationship, the boundary between the firms is no longer clear. The right balance between trust and agreements is needed so that the sharing of knowledge may successfully take place, formally and informally. Therefore, we argue that one needs a concise formal agreement already at an early stage of the exploration phase. The brief agreement may include the customer’s and the supplier’s agreement on the overall intent to collaborate, the main points of the development project, definition of the IP, and points related to sharing and exploitation of the outcome — all without too much detail. The initial agreement must not only take into account the exploration phase, but also to anticipate the exploitation of potential innovation outcome, and thus incorporate flexibilities for contingencies.

Proposition 3. Business models, that encourage both the customer and the supplier to innovate and direct their best efforts to the work, influence positively to the exploitation of collaborative innovation.

The third contribution is related to the innovation outcome and gaining competitive advantage for both the customer and the supplier. It highlights the importance of the business model in the exploitation of the innovation outcome that results from a collaboration between a customer and a supplier. If the existing business models of the customer and the supplier are not aligned with respect to the exploitation of innovation outcome, they may try to find a new business model for the exploitation in which both parties can win and are encouraged to innovate.
Our typology of knowledge transaction relationships describes the paths and underlying contractual elements on which a business model could be based.

**Limitations of the study**

In this study we aimed to obtain a broad perspective of the subject and therefore we chose innovative firms from several branches of industry. While this approach allows for a good general overview to be developed, it also raises validity limitations (Gibbert et al., 2008). At first, basic terms related to the research framework of the study (such as IP and open innovation) were understood quite differently in different branches of industry and firms. This simple difference brought additional challenges to linking the interview data (practice) with extant literature (theory), although the semi-structured form of interviews allowed us to quickly become familiar with the lingo of the firm during the interview. On the other hand, the finding that firms may understand basic terms differently is one of the outcomes of the study. Secondly, although the total number of case companies was not small, there were aspects in the study related to novel forms of collaboration for which the empirical data was limited to few cases. Also the number of firms per industrial sector was too small to perform any sectoral analysis of results, although it is well known that there are sectoral differences in the innovation patterns of firms (Tidd et al., 1997).

The three propositions were the result of a qualitative analysis of the interview data. The first proposition is such that all of the interviewees could identify themselves in the typology. The second and the third propositions are based on a smaller number of case findings. However, this does not mean that the other firms would consider the propositions erroneous or unsuitable to their business practices: it is simply owed to the fact that collaborative innovation practices are not yet fully developed at many firms. Most of the firms that were interviewed apply the novel forms of open or networked innovation in the exploration of new business, but still use traditional ways to exploit the results of innovation. This limits the possibilities as they may disregard some of the potentials that a customer–supplier partnership could offer in new business development. The validity of Propositions 2 and 3 could be better tested, after the firms have had more experience in open or networked innovation accompanied by the development of practices in both knowledge exploration and the exploitation of innovation outcome.

**Practical implications**

The practical implications of our findings for the management of knowledge and IP in customer–supplier relationships are three-fold. Firstly, sharing of knowledge
through open or networked innovation needs to be coordinated with the need to control the knowledge flow. While open innovation practice demands sharing, knowledge sharing needs to be connected to the necessary control to generate mutual profit over the outcome, and to provide motivation for collaboration for inputs. The fact that many customers have historically adopted an almost adversarial attitude towards their suppliers, while others have seen them as symbiotic partners, adds further complexity in this new era of a knowledge-intensive economy and open or networked innovation.

Secondly, the typology of knowledge co-creation and knowledge transaction relationships may help a manager to structure the variety of novel forms of open and networked innovation. With the help of this structure, the manager may understand that the knowledge and IP should be managed differently in the exploration and exploitation phases of collaboration and, then, how management should be done in both phases.

Thirdly, our findings suggest that the managers should carefully consider how to optimally allocate the rights of the innovation outcome after the collaboration project is complete. Managers should also think about new innovative business models for the exploitation of the innovation so that both parties will be motivated to give their best effort during and after the development project.

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