

IP STRATEGY IN THE OPEN INNOVATION ERA: THE CASE OF COLLABORATIVE NPD

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ABSTRACT

The most recent literature as well as the practice of companies are bringing into evidence that ensuring appropriability is very difficult, in the context of open innovation. The purpose of this paper is to study this problem, and, in particular, it is analyzed the role of organizational and managerial mechanisms in reinforcing the effectiveness of other IPPMs in collaborative NPD. The paper is based upon literature analysis and a multiple case study, involving three companies, and sheds some light on the specific organizational and managerial interventions that can be introduced within companies in order to improve the effectiveness of the IP strategy in collaborative NPD.

INTRODUCTION

Researchers and practitioners working on the topic of Open Innovation have been recently invited to work on focused sub-topics, concerning the most relevant problems that companies actually face when opening their innovation processes. Among these sub-topics, the issue of intellectual property (IP) and appropriability are recognised critical (van de Vrande et al., 2010). The most recent literature as well as the practice of companies are bringing into evidence that ensuring appropriability is very difficult, in a context in which several different types of actors are involved along the innovation process, such as Universities and research centers, suppliers, customers, professionals, competitors, companies operating in different industries, institutional agencies. The purpose of this paper is to study this problem, investigating the effectiveness of different Intellectual Property Protection Mechanisms (IPPMs) (patents, trademarks, copyright etc.), i.e. their ability to increase appropriability, without undermining the flow of knowledge and the exchange of ideas which is at the basis of a collaborative and open environment. The focus is on a specific type of open innovation process: the collaborative new product development (NPD) process.

The literature, as illustrated in the following section, has already pointed out that appropriability is not only a matter of IP protection mechanisms, either legal or strategic, but that it involves also the management and organization of the innovation process, from idea generation until final commercialization. However, the literature is still studying such managerial and organizational aspects of appropriability, since, at the moment, there isn't any consolidated model or practice widely accepted by academics and actually used by companies. This paper aims to make a further step in this direction, trying to answer to the following main research question:

- Which managerial and organizational interventions can reinforce the effectiveness of IPPMs in ensuring appropriability in collaborative NPD contexts? How they actually influence appropriability?

BACKGROUND LITERATURE

The literature background of this paper is quite complex, since it is based upon three fields of study, respectively on: 1. Intellectual Property Protection Mechanisms (IPPMs), 2. Open innovation and 3. NPD. As showed in figure 1, the reference

literature for this paper is represented by the four intersection areas among the three streams above, and is thus referred to: a) the role of different Intellectual Property Protection Mechanisms (IPPMs) in open innovation processes (for example, Hurmelinna-Laukkanen, 2011); b) the management of new product development process in open innovation contexts (for example, Bahemia and Squire, 2010); c) the problem of protecting innovation with IPPMs along the whole new product development process (for example, Kalanje, 2006); and d) the complex management of intellectual property along the whole new product development processes in open innovation contexts (for example, Lazzarotti et al., 2012).

In similar vein to Hurmelinna-Laukkanen and Puumailainen (2007), and Ritala and Hurmelinna-Laukkanen (2013), we assume as IPPMs “an extensive set of rights and mechanisms”:

- IPRs (e.g. patents, design, copyrights, trademarks, trade secrets);
- contracts (e.g. NDAs);
- lead time advantage, tacitness, secrecy and complexity of knowledge;
- labour legislation (e.g. inter-firm contracts on not recruiting personnel from each other, employees’ noncompetition and nondisclosure agreements);
- managerial and organizational mechanisms such as:
 - human resource management (HRM) and organization (restrictions on employee mobility and communication, altering contact persons in collaboration, making personnel committed to the firm, roles and coordination mechanisms dealing with IP);
 - systems and tools (e.g. practical and technical means of limiting access to certain information, such as passwords and digital signatures, copy prevention, and cutting off access to information on a particular date).

The hereinafter analysis of the four intersections brings out a shortage of contributions, particularly concerning the managerial and organizational mechanisms, that is such to have encouraged our work.

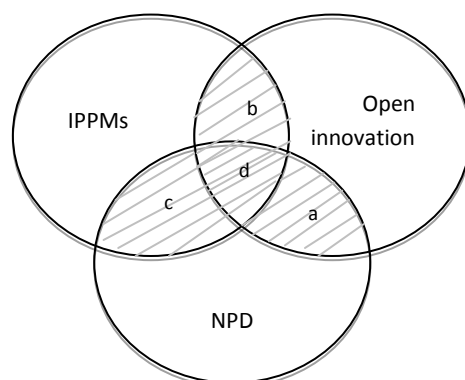


Figure 1: Background literature of the paper (grey lines indicate the literature investigated)

Collaborative NPD as a type of OI (a)

Collaborative NPD has been traditionally studied by analysing the collaboration or co-operation between firms and Client-Supplier (Hartley, Zirger and Kamath, 1997; Bidault, Despres and Butler, 1998; Lam and Chin, 2004). However, several authors have recently demonstrated that interaction along NPD is also growing with other types of external entities, such as: TSS – Technical and Scientific Services companies (“services which rely upon technical and scientific knowledge and provide output that is, again, technical and scientific knowledge); universities, research centres,

governmental institutions and even competitors (Howells, 1999; Larsen, 2000, Laursen and Salter, 2004, 2006; Lazzarotti et al., 2011).

Other conceptual and empirical contributions within this stream of literature focused on the phases of NPD (i.e. idea/concept generation, industrial design, etc.) that could be opened. In each phase, companies can potentially access external sources of ideas, technology and know-how, or transfer them to the outside environment (van de Vrande et al., 2006; Lazzarotti and Manzini, 2009) for different reasons: gaining access to new areas of knowledge (also complementary knowledge), managing capacity problems, reducing time-to-market and sharing risks and costs.

IPPMs and Open Innovation in general (b)

If the problem of appropriability is relevant in traditionally closed innovation contexts, the issue becomes critical in an open innovation context. Indeed, several studies alert firms about hazards that openness and collaborations could cause in terms of innovation appropriability (Gulati and Singh, 1998; Cassiman and Veugelers 2002; McEvily et al., 2004; Alexy et al., 2009; West and Bogers, 2011). More specifically, the risk of unique-knowledge and strategic asset loss (Schmiele and Sofka, 2007), the risk of knowledge spillovers by partners (De Faria and Sofka, 2010) and the threat of partners' opportunistic behaviours (Tripsas et al., 1995; Vangen and Huxham, 2003) are the most commonly problems pointed out in collaborative innovation.

Moreover, other studies in this area aim to investigate whether IPPMs act as enablers or disablers for Open Innovation (Gallini 2002; Arora et al., 2001; West 2006; Alexy et al., 2009; Pisano and Teece, 2007). For example, the study by Alexy et al., (2009) finds that legal IP rights, such as patents or design registration, can become the "currency of open innovation" and facilitate collaborative research and development activities. In fact, when companies find an idea that they want to turn into a product, its acquisition is much easier if the underlying technology is protected by a patent or a design: companies understand from these what the idea is about and how it works; at the same time, inventors do not fear that companies misappropriate their idea, because the patent or design proves it is theirs. According to this perspective, tacitness and trade-secret are seen as the real disablers of Open Innovation because they effectively inhibit potential collaborations and they can also compromise the success of those eventually started by highlighting the lack of trust among the partners (Alexy et al., 2009; Hertfeld et al., 2006; Bogers 2011). More in general, it can be argued that secrecy is hardly compatible with Open Innovations because collaborations quite often intrinsically imply knowledge sharing. Once again, a combination of approaches (IPRs plus contracts and managerial/organizational mechanisms, well implemented without extremism) seems to be a reasonable solution (not yet sufficiently investigated) in order to put aside tacitness or secrecy and thus make collaboration more fluent and less risky for all participants (Ritala and Hurmelinna-Laukkanen, 2013).

IPPMs and NPD (c)

Studies in this area focus on the different types of industries, firm-size and type of innovation and try to identify which IP protection tools are most suitable for a particular type of industry, firm-size or innovation. For example, it is well known that patents are effective in the pharmaceutical industry, whilst in consumer electronics "inventing around" is easier to do (Levin et al., 1987; Cohen et al., 2002; Hussinger, 2006; Teece et al. 2011). Moreover, other studies (Gallié and Legros, 2012) suggest

that industrial firms patent more than service firms, because their knowledge could be more tacit (and thus better protected by trade secrets). Empirical studies also show that small and medium firms patent less than large companies and they commonly prefer trade secrets because of financial-resource lacks (Arundel and Kabla, 1998; Baldwin and Hanel, 2003). In addition, the specific type of innovation seems to be a determinant, e.g. radical innovations can be protected by legal IPPMs better than incremental ones, and product innovations can be better protected by these than process innovations, for which secrecy is preferable (Levin et al., 1987; Hussinger, 2006).

Some lack in literature was highlighted by a very recent review about IP in innovation management research (Candelin-Palmqvist et al., 2012), thus encouraging our work. First of all, the level of analysis of the IPPMs studies is rarely on the firm level (almost 90% of the cases is on the macro-level, such as industry or country-based). Moreover, most of the contributions study the choice of patent versus trade secret and very few studies address the issue of how several IPPMs could be used in complementarity to protect innovation (Landry et al., 2006; Hussinger, 2006; Hanel, 2008; Gallié and Legros, 2012). Even though it is quite evident that companies, which typically have more than one invention, tend to bundle different IP protection tools (Levin et al., 1987), it is not so obvious in the case of a single invention. Nevertheless, in actuality few authors adopt such a perspective. Relevant exceptions are those by Cohen et al. (2000) who highlight different situations in which a combined use of IPPMs is possible, even for a single invention. This is common for example in the chemical industry, where an invention is composed of different elements, which can be protected by different IPPMs. Moreover, Hussinger (2006) suggests that different IP protection tools may be used at different stages of the innovation process (NPD process), in coherence with the changing level and nature of uncertainty (Trott, 2008; Hussinger, 2006; Ulrich and Eppinger, 2000). For example, trade secret can be applied in early stages of the innovation process, when and since the research outcome is still uncertain; while patents can be used when the invention is developed and ready to be commercialized (after the invention has entered the market, however, patents and secret become mutually exclusive because of the patent disclosure requirements). In any case, although a complementarity approach is recommended, the empirical evidence is still scarce, above all on the managerial and organizational mechanisms. In line with this literature perspective, we suppose here that different IPPMs can be used at the same time for a given NPD and we attempt to enrich the evidence about such complementarity approach, with particular attention to managerial and organizational mechanism dealing with IP.

IPPMs and Collaborative NPD as specific form of OI (d)

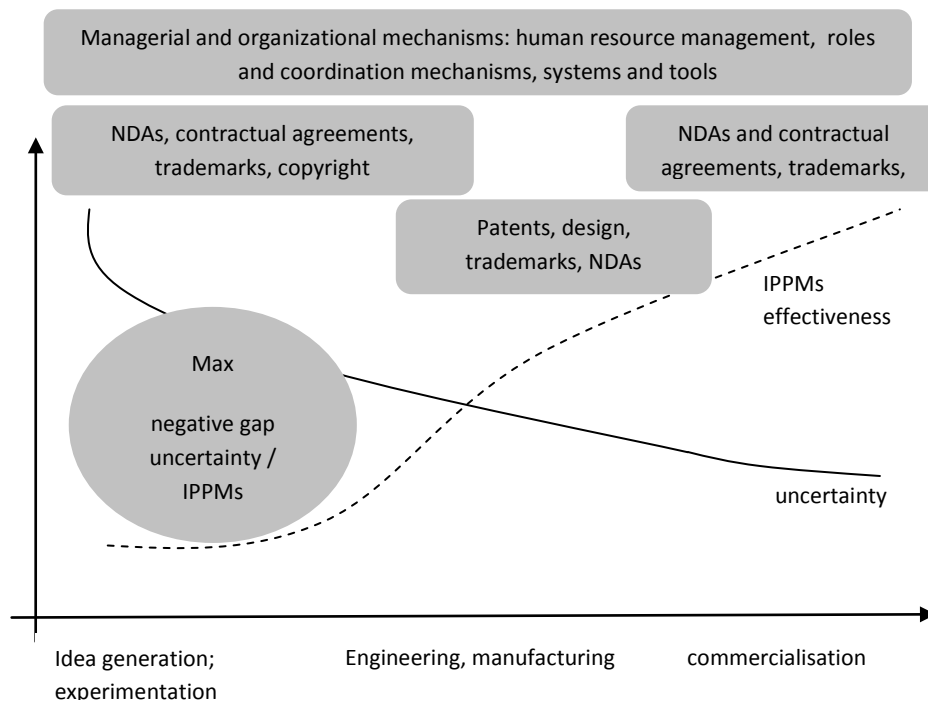
This last area of intersection defines precisely the theoretical scope where this paper attempts to give a contribution. In this area, most of the studies concern the type of IPPMs available, according to the type of partner in collaborative NPD. Universities or research centres emerge as the most problematic partners, since their strong interest in diffusing innovation through scientific publications prevents both trade secret and patent application (Hertzfeld et al., 2006). Moreover, the time frame of collaboration has been considered (Mehlman et al., 2010; Slowinsky et al., 2009; Hertzfeld et al., 2006), in order to investigate which are the most used and effective IPPMs for different time frames. For instance, Herzfeld et al. (2006) find that confidentiality agreements and non-disclosure agreements are the most used and effective forms of IP protection when exploring the opportunity of collaboration with different potential

partners, while patents are used in next stages. Also the collaboration objectives have been considered as drivers in choosing the most suitable IPPMs (Bogers, 2011). For example, when the explorative and pre-competitive nature of the collaboration creates the need to establish an open sharing strategy, partners can apply free-cross licensing to grant each other the required background knowledge embedded in their patents, thus using patents as (free) currency for collaboration. Instead, when the technological distance between partners is high there can be a need for a more formalized knowledge transfer by means of traditional licenses. Transfer of know-how, however, could be covered by a general secrecy (non-disclosure) agreement, facilitating in any case a more open sharing atmosphere. Although quite recent, this type of study is becoming increasingly important (Mehlman et al., 2010). However, detailed exploration on how to create this more open atmosphere, for example by setting up managerial and organizational mechanisms, is still scarce.

In addition, to the best of our knowledge, very limited attention (Slowinsky et al., 2009; Manzini et al., 2011) has been dedicated to understanding whether and how the specific phase of the innovation process, in which the collaboration takes place, is related to the use of different IPPMs. It has already been brought into evidence that the use of different mechanisms is recommendable along different NPD stages, according to the uncertainty level (Hussinger, 2006); this is even more evident when partners change along such stages (Manzini et al., 2011). It is argued that it is completely different to protect an innovation that needs to be shared with partners when the collaboration concerns idea generation, i.e. fuzzy and not yet codified innovation, with respect to an innovation that is almost ready to be commercialized and embedded into a physical artefact.

Manzini et al. (2011) have attempted a synthesis on the different mechanisms which are more effective along the innovation funnel (see Figure 2), by depicting a framework to drive companies in their IPPMs choices. In this framework uncertainty plays a relevant role. The early phase of the innovation process, where uncertainty is high, is the most critical area (the gap “uncertainty – effectiveness” is maximum). It is necessary to invest (resources and time) to build a robust “ad hoc” set of IPPMs, in which legal and especially contractual IPPMs are used together in a complementary manner. In this phase, trademarks can probably represent an effective (complementary) legal mechanism to be used. As far as uncertainty decreases, the effectiveness of IPPMs increases, in particular of legal ones. Anyway, protecting innovation should always be conceived in terms of a “bundle” of tools, in order to maximise effectiveness. When collaborations concern the later phases of the innovation funnel, it is important to have the innovation and knowledge already embedded into (a set of) IP rights, so as to facilitate exchanges and negotiations with potential partners and to avoid opportunistic behaviour.

Although the framework explicitly includes managerial and organizational mechanisms and recommends them along the entire collaborative funnel, however detailed implementation aspects are still neglected. In the attempt to cover this gap, a multiple case study is here presented, in order to explore which managerial and organizational actions could be introduced within companies to enforce appropriability.



The proposed framework, which is drawn from the most recent literature, does not concern the implementation aspects, that is how the use of different IPPMs along the collaborative NPD process, with different partners, can be actually translated into managerial and organizational actions and interventions to be introduced within companies. For this reason a multiple case study was organized, in order to deepen the problems concerning the implementation of the framework.

THE EMPIRICAL STUDY

A multiple case study is conducted to investigate the problem, i.e. the integrated use of IPPMs, managerial and organizational solutions to increase the appropriability of innovation in collaborative NPD processes. Case study research seems to be suitable for the objective of the paper (Eisenhart, 1989, Yin, 2009). The study involves three companies, operating in the Chemical, Electronics and Mechanical industry. The three companies are studied with a common research protocol, which is based upon direct interviews and (NPD projects) documents analysis, and which explores:

- The IPPMs used along the NPD process and with the different typologies of partners involved;
- The organizational interventions introduced to increase appropriability;
- The managerial interventions.

The interviews followed a semi-structured protocol; in order to avoid misinterpretation and to ensure triangulation two different interviews were conducted, with the R&D and the IP managers, and three including marketing managers when necessary. Secondary sources were collected, in terms of specific innovation projects documents (delivered under NDA agreement), in order to verify coherence and completeness of data and information. Where necessary, follow up interviews were carried out. The in depth investigation of the three cases above allowed to capture how the problem of appropriability is dealt with in these companies, not only in terms of IPPMs, but especially with respect to the organizational and managerial

interventions introduced. A cross case analysis was conducted in order to draw the results.

Case description

The three companies investigated (names are blinded for confidentiality reasons) represent three significantly different contexts, in terms of size, industry, and type of innovation process, as synthesized in the following description.

Company C is a big chemical group, working in many different chemical industries, traditionally in the areas of textiles, leather, pulp and paper, oil drilling, ceramics, paints and varnishes, more recently for detergency, mining and PVC additives, civil engineering and construction, photochemistry cosmetics, personal care, agrochemistry and food.

Company E is a medium-sized multinational company, world leader in a variety of scientific and industrial applications where stringent vacuum conditions or ultra-high pure gases are required. Applications of E products are in information display and lamp industries, in ultra-high vacuum systems, electronic device-based applications, vacuum thermal insulation

Company M is a medium company with manufacturing and process experience in extrusion and compounding solutions, for example in the fields of reactive compounding, biocompounds, recycling, PET, WPC and composite applications. M's machineries are mainly used in the automotive, in the packaging and in the construction industry.

In the following table, the characteristics of the collaborative NPD process of the three companies investigated is given and the type of partners involved in each phase of the process is specified.

Com-pany	NPD process		Main Partners involved
C	Idea generation	Definition of a new concept for a specific existing market need, in collaboration with customers; exploration of new technologies and molecules for totally new applications, for which a target market is not yet identified, in collaboration with universities and/or research centers	Customers; Universities; Research centres
	Develop-ment	From the prototype of a new chemical additive to the definition of an industrialized product, fully compliant with the specifications defined with the client or with a specific new functionality (as defined in the idea generation phase)	Customers; Suppliers
	Commer-cialization	Definition of the operative marketing choices, in coherence with the target market for the new product	Customers
E	Idea generation	Two main innovation processes are managed in parallel: continuous and discontinuous innovation. The first one is aimed at developing the Technology and the Product Portfolios and at exploiting them either within already addressed	Universities, companies from different industries,

		applications or towards existing applications not yet addressed by E. This phase is mainly conducted with (potential) clients and sometimes universities or research centers when other competencies than those internally available are necessary. Discontinuous innovation is aimed at long-term technology development, the exploration of new business models and the exploration of innovative innovation models. In this case partnerships often involves universities, researchers, companies operating in different industries and also governmental institutions for capturing stimuli, suggestions, weak signals of new technological opportunities	governmental institutions, clients
	Development	Development activities can be more or less complex, depending on the distance of the innovation from the existing company's competences. Clients may be involved in this phase to ensure coherence with the final use. Quite often collaboration are set up with suppliers when new machineries are necessary or when improvements in existing machineries are required. In some case, internal production of technology required for development is carried out.	Clients, suppliers, companies from different industries, governmental institutions
	Commercialization	Collaborations with final clients are sometimes used to identify the most proper distribution channels and price. Suppliers as well can be involved when this can improve trust and hence effectiveness of development collaboration	Clients, suppliers
M	Idea generation	The marketing manager and the company's owner explore the opportunity for innovations and new machinery functionality, collaborating with (potential) clients and especially universities or research centers. Institutional bodies are involved when the innovation concern functionalities that improve performance with respect to environmental and safety issues	Universities; Research centres, institutions, clients.
	Development	Suppliers are involved in order to identify and acquire the necessary new components for innovation; consultants or companies operating in other industries are sometimes involved when specific technical competences are not available internally	Suppliers, Universities, Consultants,
	Commercialization	Commercialization is quite often designed in collaboration with the clients, since the innovation is usually designed and developed with them.	Customers

Table 1: Phases and partners involved in collaborative NPD

Table 2 is dedicated to the strategic use of IPPMs along collaborative NPD processes: it describes the type of IPPMs used in the different phases of the process, by highlighting the main difficulties that companies found in ensuring the appropriability of innovation and giving some insights on the (tentative) solutions adopted by the to face such difficulties.

Com- pany	IPPMs used in the different phases of the NPD process	Main Problems with appropriability and (tentative) solutions
C	<p>Idea generation: NDA, JDA contractual agreements.</p> <p>Development: patents, NDA</p> <p>Commercialization: patents, trademarks</p>	<p>In the past, researchers were not fully aware of the problem of appropriability and were not familiar with the culture of IP, especially patents, which are the most relevant IPPM in the chemical industry. As a consequence, internal researchers were not able to map existing technologies and know-how and to find the right partners for new product development, i.e. those possessing the desired know-how and technology. Furthermore, the IPPMs used during collaborative NPD were sometimes of poor quality (especially NDA and JDA, but also patents), i.e. not properly identifying the specific characteristics of the technology and, hence, were sometimes not effective. More recently, the company started to train researchers in order to make them the real guarantors of appropriability. With a better knowledge and understanding of IPPMs they are becoming able to work closely with the IP department in order to identify the right IPPMs for the different phases of the innovation process and for collaborating with different typologies of partners. This allows avoiding NDAs and JDAs that loose critical elements and to identify the proper time to patent the innovation, in agreement with the partners. Patents are thus becoming an enabling factor for technological collaborations. By widely exploiting patent exploratory intelligence, researchers not only access to a huge know-how repository at low cost, but also avoid using already protected technology and identify the real “free” areas for innovations. There is a strong collaboration between the researchers and the IP department, which company C believes is critical to ensure efficiency and effectiveness of IP strategy and management. Attention is also given to the secrecy of information, continuing a tradition in the industry, which has always been careful in giving access to critical information and data to external people.</p>
E	<p>Idea generation: NDA, contractual agreements.</p> <p>Development: Patents</p> <p>Commercialization: Patents, design, trademarks (only recently).</p>	<p>Internationalization is one of the critical success factors for company E, which sales abroad 95% of its total turnover. As a consequence, NPD collaborations quite often involve foreign companies and this makes appropriability a very complex problem, in terms of both identification and implementation of possible solutions. NDAs, but also patents, are sometimes infringed by foreign partners with which company E tries to (or has) set up collaborations. Such problems emerge not only with partners (especially suppliers, but also clients) coming from countries as China or Korea, which are well known for the weak IP regime, but also with US’ companies. The litigation in these cases becomes really</p>

		<p>expensive and rarely successful. Company E is now trying to reduce these problems by working hard for improving the quality of IPPMs used in collaborative NPD in order to reduce the possibility of infringement and/or to increase the success rate of litigations, even when international. To this aim they are adopting some organizational solutions, increasing the integration between R&D and the IP department. Instead of calling the IP specialists once the innovation and the related collaborative NPD process is going on and is near to its end, researchers and technologists collaborate with the IP since the early phases of new concept generation, in order to make the potential innovation understandable for IP specialists, that have to protect it along the whole process and with respect to different external actors, without preventing the company from exploiting external collaborations. The knowledge management unit is involved as well, with its competence concerning the codification of know-how and also the evaluation of its strategic relevance. Furthermore, sellers are involved to verify the characteristics of the clients that could be involved in the NPD process and which is the risk of opportunistic behavior by them. Sellers' involvement also allows making them aware of the risks for appropriability when they disclose information to potential (foreign) clients. Other relevant problems emerge for appropriability when collaborations are set up with partners that are not "companies", such as universities, research centers, institutional bodies. These partners, in fact, have a completely different logic in managing IP and do not evaluate innovation protection from a monetary point of view: they are interested in the (timeliness) scientific publication of research results, in the public dissemination of knowledge, in the scientific relevance of an innovation (rather than on the consequent potential profits). However, universities and research centers are considered critical for accessing excellent competences and to nurture innovation in the long run. Hence, company E is working for selecting a limited number of excellent partners of this type, with which a long term relationship can be established that, in turn, allows to find a set of shared rules and behaviors able to satisfy all the different expectations without undermining the possibility to make profits with an innovation. This set of rules and behaviors involves not only the problem of the publication and dissemination of results, but also the risk of spill over and the management of flows of information with the partners. Company E is observing that this strategy in partners' selection is already giving some results, reinforcing the use of NDAs and JDAs.</p>
M	Idea generation: NDA, trade secret, contractual agreement	Company M is facing a very complex situation concerning the appropriability of its innovation. M's innovations in fact concern M products (extrusion machinery), but also the clients products, as M tries to build new machineries with new functionality that allows the clients to realize / to work with new

<p>Development: NDA, JDA, Patents Commercialization: Trademarks, Patents</p>	<p>products / materials, with better characteristics and performance in terms of cost and availability of raw materials (plastic, additives etc.), process efficiency, environmental compatibility. This forces M to collaborate with a wide variety of partners and in all the phases of the innovation process. Furthermore, M innovation can be easily imitated (especially when machinery are showed in fairs and exhibitions), inventing around is easy as well and sometimes patenting is difficult as the inventing step is small, even if the market potential is relevant. As a consequence, during the innovation process, trade secret is crucial until it is clear whether or not patenting is a feasible solution but, at the same time, collaborations are necessary. In this context, company M decided to assign the task of appropriability to the marketing manager, which became responsible also for IP. This is due to the fact that innovation is mainly market pull and, hence, the marketing manager is involved in the innovation process since the concept idea generation and until the final commercialization. In this way, the problem of appropriability is coherently dealt with along the whole innovation funnel and it is explicitly linked to the need to make profits with the innovation, and not only to the opportunity to invent something new and technically advanced. Obviously this choice implies for the need of training for marketing people and especially for the marketing manager, who has to be confident with all the type of IPPMs (and their use), and has to collaborate with external IP professionals (consultants and patent attorneys). Especially, the marketing manager monitors the retention of the trade secret, identifies the right timing for patenting, works closely with the IP consultants in order to find the most proper IPPMs to protect innovation (while at the same time maintaining good relationships with partners). This last point is crucial for ensuring high quality IPPMs, especially NDAs, JDAs: M has in fact experienced in the past several conflicts with partners, even within publicly funded programs, due to low quality NDAs, which allowed partners to patent themselves the M innovation. One more aspect seems to be critical for company M, which has still to invest on that: the culture and training of employees on IP. Employees, especially those at the operational level, practically involved in the development phase of the innovation, have access to critical information and data and should be aware that they cannot disclose anything, even during coffee breaks or informal talking with other employees or with frequent partners, if trade secrets are used to protect innovation until patenting is feasible. Together with this, severe rules for the management of critical (secret) information are being introduced, for regulating both electronic information and physical one (i.e. those embedded in documents, products, components).</p>
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Case Discussion

The three cases briefly described above do not necessarily represent “best practice” cases: they just bring into evidence some relevant problems and the related tentative solutions, that at the moment seem to be successful from the point of view of the involved managers, who believe having found a way to reduce damages and problems created in the past by a poor management of the IP problem during collaborative NPD. For this reason, it could be useful to draw some observations from the study and to evaluate them with a critical approach.

A first observation concerns the fact that the effectiveness of an IP strategy in collaborative NPD cannot be evaluated without considering organizational and managerial issues: the same set of IPR tools and contracts can be more or less effective depending on the set of actions taken on the organization and management of the innovation process. In this sense, the three cases confirm the conceptual position that the literature has already proposed (Hurmelinna-Laukkanen and Puumailainen; 2007, Ritala and Hurmelinna-Laukkanen, 2013; Manzini et al., 2012), but that still needs to be validated and diffused. All the three companies investigated experienced a low effectiveness of their IP strategy in collaborative NPD and are trying to improve it by means of organizational and/or managerial interventions. These are particularly important when the IPR are intrinsically weak, as in the case, for example, of patents for process innovations, or trade secrets when several internal and external people are involved in NPD.

Another important observation concerns the fact that NPD takes place in increasingly complex contexts: the internationalization of the NPD process, frequently favoured by publicly funded international programs, brings companies to collaborate with a wide variety of partners in many different countries. In such contexts, uncertainty and the risk of reducing the appropriability of innovation is dramatically high. The effectiveness of IPRs and contracts is further reduced by the ambiguity generated by the partners’ reference to different legislation contexts. In such a complex context, companies need to put in place different organizational and managerial solutions than those adopted in the past for an effective IP strategy. From this point of view, company E found that in order to better face an international partnership and the consequent potential litigations it is critical to maximise the completeness and accuracy of information concerning the (foreign) partners, their markets, their technology and the related IP status. To this aim, integration among marketing people, business developers, R&D and IP has been increased, by involving all of them within an Innovation Committee, in which the IP strategy can be conceived in a comprehensive way. Similarly, company M put everything in the hand of the marketing manager, by recognising its critical role along the whole innovation process and delegating to him the task to collect the necessary competences for ensuring the appropriability in collaborative NPD. Different ways with the same objective: ensuring integration of information and data coming from the marketing, technical and IP units and from the external partners and for defining the IP strategy able to take into consideration the many aspects of appropriability.

From the point of view of managerial mechanisms usable to reinforce appropriability in the IP strategy, the case study confirms the relevance of confidential clauses for researchers and of “systems and tools” such as passwords, secrecy, access restriction, as already suggested in the literature (Hurmelinna-Laukkanen and Puummalainen, 2007). But the study brings also into evidence another important managerial concern: the relevance of employees’ culture and hence of training personnel on IP and appropriability. All the three companies involved started training programs on the

topic, with all levels employees from different functions: R&D, marketing, manufacturing, engineering. This is particularly relevant in the context of open innovation, where “standard” systems and tools may be strongly stressed by the multiple interactions with a wide variety of partners, which sometimes make those systems inadequate and less effective. Open innovation, in fact, may create new and different working conditions for researchers, that usual technical means of protection may not be able to support.

Probably most interesting is the contribution of the empirical study to the understanding of organizational interventions, which have been somehow neglected in literature so far. From this point of view, the study shows that the need to improve the effectiveness of IPPMs may lead companies to introduce organizational interventions that increase the integration of the (many) different competences that are necessary to this aim: IP, marketing, R&D, engineering, manufacturing. These interventions can first of all modify the organization chart, in the sense that new organizational units or roles can be assigned the task to reinforce appropriability. This is the case for example of company E and M, which identified a specific unit or role that, representing and coordinating a set of different competences along the innovation funnel, has the opportunity to deal with the appropriability problem with the most complete point of view. Other relevant organizational interventions emerged from the study concern the introduction of procedures especially conceived to maintain appropriability in collaborative contexts. Company C for example introduced as a standard procedure the explorative patent analysis in the idea generation phase, which allows, where necessary, to find the most proper partners for NPD, to avoid the use of already protected technologies and to start collaborative NPD with a clear picture of the partners’ patent situation. This, in turn, would reduce litigations concerning IP and prevent the company from launching collaborative projects with a high risk for the appropriability of final results. Company M modified the internal working and logistic procedures for collaborative NPD projects, in order to keep secrecy and avoid uncontrolled spill-overs with partners.

CONCLUSIONS

In the end, the paper is giving only a first tentative answer to the research question proposed in the introduction: Which managerial and organizational interventions can reinforce the effectiveness of IPPMs in ensuring appropriability in collaborative NPD contexts? How they actually influence appropriability?

It is confirmed the relevance of such mechanisms, and the need to integrate them with other IPPMs, such as IPR, contracts, etc. With respect to the framework described in figure 1, referred to the literature state of the art, the study conducted in this paper suggests an improvement, concerning the relevance of such mechanisms along the innovation funnel. As a matter of fact, organizational and managerial interventions aimed at reinforcing appropriability need to be used especially where other IPPMs are particularly weak, such as, for example, at the beginning of the NPD process, when uncertainty is very high and partnerships are played on ideas, opportunities to be explored, experimentation activities of which the results are not clearly predictable.

The paper also shed some light on some specific managerial and organizational interventions, which have not yet been investigated by the literature so far. Obviously, the paper makes only a first little step in this investigation, but it suggests some guidelines for future research.

The paper is based upon a multiple case study and, as such, has some limitations concerning the generalizability of the study. In order to improve this aspect, a more extensive study is planned for increasing the validity and generalizability of the study.

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